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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
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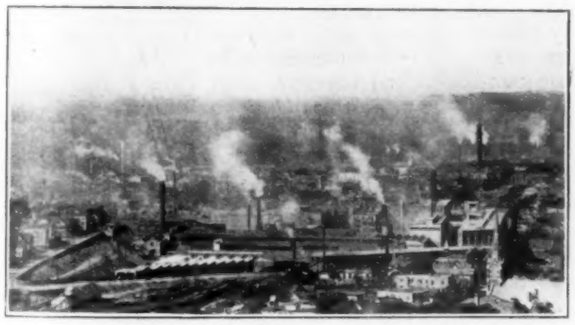
The Scovill Manufacturing Company

The Oldest Brass Company in America

To write the history of the Scovill Manufacturing Company—of its mile-long plant, its two hundred buildings, and its diversity of products,—is to outline the course of industrial growth as it has occurred in America through the last one hundred and twenty years. It is, more specifically, to trace the gradual development of a primitive brass-working business not only through the heavier mill operations and back to the casting process on the one hand, but also into the most complex and exacting production of varied and exquisitely finished manufactures

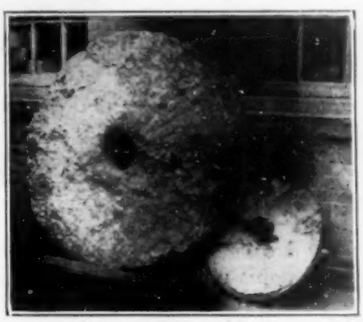


SCOVILL MANUFACTURING COMPANY WEST PLANT

on the other. For the Scovill Manufacturing Company has grown from simple button-making—conducted first in a domestic lodging,—to large and modern casting shops, mills for rolling, extrusion, tube making, and wire drawing, and a manufacturing department which produces thousands of different articles, from automobile parts to "vanity boxes."

This is, of course, not surprising, since the industrial history of this country during the same interval of years, —1802 to 1923—is precisely the history of such a development. In the evolution of American industry during this time, horse power gave way to water power, water power was displaced by steam, and independent steam units were replaced by electric motors receiving power from large central stations. A commensurate evolution occurred in productive processes: the early handicrafts and tricks of the trade gradually gave way to scientific control, based upon an analytical study of the materials and a technical direction of the processes of operation. Similar developments appeared in the parallel branches of industrial relations, business organization, and accounting control. Labor multiplied: in place of a room full of artisans who were skilled in their craft, there appeared hundreds of operatives, working upon automatic or semi-automatic machines, with a thousandfold increase in quantity of product. The old partnerships grew into corporations, their capitalization increasing many fold to keep pace with the continual enlargements of plant necessitated by the new methods of production and service. Managerial problems grew continually more complicated, until questions of cost, overhead distribution, time and piece rates, etc., necessitated the establishment of complete departments of accounting and administration. The modern plant of today in America has its own industrial hospital, its recreational clubs, its telephone, telegraph, fire, and guard departments, and in its service agencies alone involves a problem of administration and personnel greater than its entire establishment of a half-century ago. Our peculiar interest in this resume of industrial history is simply that it is exemplified in its every process by the history of the Scovill Manufacturing Company.

Located in Waterbury, Connecticut, the Company holds the pioneer position in a region which has for the last half-century claimed over 70 per cent of the brass-making and brass-fabrication of the country. Appropriately enough, the company's plant is located on the site of the first mill in Waterbury—an old grist mill built in 1679. The last timbers of the old dam were torn out in 1876, and the Scovill company still preserves the old mill stones which were used in grinding the corn and other grains of the early community. This mill was operated until 1808, when it was taken over by the early brass makers, and for many years after there was a certain amount of grinding done for the general convenience of the citizens.



OLD MILL STONES

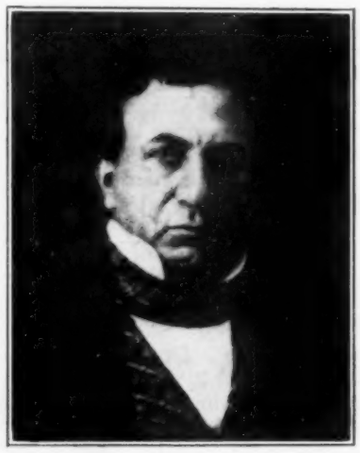
ABEL PORTER & COMPANY—1802

Brass making as a permanent industry in Waterbury developed from the business of metal button making.

The earliest case of this button industry seems to have been a silversmith's shop in 1753. About 1790, pewter buttons were manufactured here by three brothers, and it was one of these, Silas Grilley, who entered into partnership with Abel Porter, Levi Porter, and Daniel Clark to make the wire-eye brass buttons. This partnership, formed in 1802 and known as Abel Porter & Company, was the original form of the Scovill Manufacturing Company.

THE ORIGINAL BUTTON SHOP

The little shop of Abel Porter and Company was located in a private dwelling. Copper was obtained by the purchase of old copper materials, such as worn-out stills, kettles, sheathing, etc. Zinc, imported from England, was added and the resulting alloy cast into ingots of brass. Previously, brass had been imported from England or the copper had been melted with calamine. The direct fusion of copper and zinc had been invented in England only twenty years before, and the adoption of the practice by the little Waterbury partnership in 1802 apparently marks the first use in this country of the modern method of brass-making. The brass ingots were sent to an iron mill some thirty miles away to be broken down and rolled into sheets. This also is to be regarded as a significantly progressive procedure, since it was at that time still the rule for brass to be cast into final form and then turned and polished, or to be laboriously hammered to the desired thickness. Porter's brass, being in rolled sheets, was brought back to Waterbury and finished on 2-inch rolls. Forms were struck by dies from these sheets and then made by hand work into buttons. The faces were then gilded and the finished product marketed from house to house or sold to peddlers for wider distribution. The rolls were operated by horsepower and the total personnel counted only 13 people, including the four proprietors.

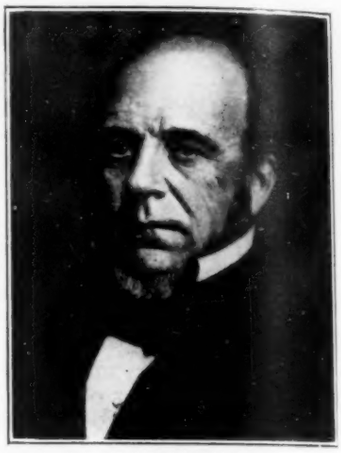


J. M. L. SCOVILL

President 1850-1857.
Born in Waterbury 1789, died 1857.
1811, Member of firm of Leavenworth, Hayden and Scovill.
1827, Member of firm of J. M. L. and W. H. Scovill.
1836, Member of Firm of Scovills and Buckingham.
1850, President of Scovill Manufacturing Company.
"The manufacturing interests of Waterbury are more indebted to him than to any other man."

This cumbersome procedure was followed with sufficient success to enable the partners to buy, in 1808, the old grist mill location, where water power was readily available. A button shop was built, and subsequently the rolling mill was constructed, and in the course of the next twenty years the company became entirely self-sufficient in its operation. This was, and remained until 1823, the only consistent effort in the United States to roll brass.

In 1811, there came into the management of the business, as junior partner of a new firm, James M. L. Scovill, to whose industry, resourcefulness and foresight are largely due the growth and stability of the plant for the next half century. Mr. Scovill was of old and honored Waterbury lineage, the son of a merchant farmer of the town, and the product of one of the justly famous New England "district schools." He became senior partner in 1827, being then joined by his brother, William H. Under his leadership, the company became established as a manufactory of rolled brass and brass wire, while the number and variety of its manufactured products steadily grew. When he died in 1857 he left his name associated with one of the substantial corporations of the country, widely patronized and reputed alike for high quality of product and strict integrity of business dealing. The brothers "were both characterized by business abilities of a very high order, while their individual qualities made each, in some sense, the complement of the other. . . . They consequently worked together more than a quarter of a century with the utmost harmony and effectiveness. Both were of large views, generous and liberal in matters of public interest and in those of private beneficence."



W. H. SCOVILL

Born in Waterbury 1796, died 1854.
1827, Member of firm of J. M. L. and W. H. Scovill.
1836, Member of Firm of Scovills and Buckingham.
1850, Treasurer and Director of Scovill Manufacturing Company.

Almost from the first, the business struggled against serious competition from buttons of English manufacture. The English not only benefited by an exclusive finish but employed a method of plating which put the young Waterbury company at a serious disadvantage. "Gold to the value of three dollars was used in gilding a gross of their best buttons, while the use of gold to the value of three pence sufficed for as good results by the English methods." In 1817, the product was diversified by the manufacture of lamps and other brass articles—this being done in a room hired by Daniel Hayden in the factory building. Hayden also constructed a machine to cover buttons with cloth,—thus opening up a large field of manufacture for modern dress buttons, fasteners, etc. The real start of the Company's success was, however, in 1820

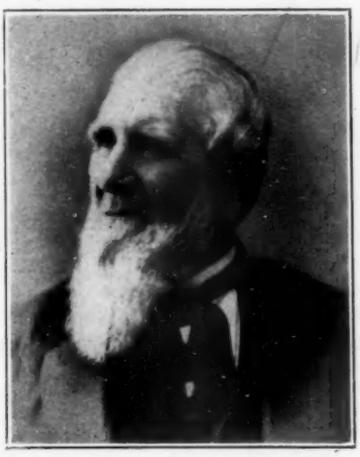
PLANT OF THE SCOVILL BROTHERS IN 1835

and the years following, after the Englishman, James Croft, had been employed by the company, bringing an expert knowledge of the methods of his own country in gilding and in the chemical process for securing a peculiar orange tint which was especially appealing to the trade. To avail himself of the superiority of the tools then used in English shops, Croft later brought from England an expert toolmaker in the person of Samuel Frost. Superior stones for lathe burnishing, for example, were almost exclusively of English origin, and were relatively limited in supply. Their possession constituted almost a personal monopoly on the part of the skilled operator who owned them. The coming of these workers to Waterbury marked a definite advance in its technique of brass production.

The business under these new conditions received a great impetus and its products acquired the highest reputation. A note in a New Haven newspaper in 1823 refers to this company's remarkable production of "20 gross of gilt buttons per day"—the present rate of button manufacture is about 70 gross per minute. In 1824, with no inconsiderable pride, the Company made a set of solid gold buttons with a profile of LaFayette stamped on them and presented the outfit to that national hero on his visit to America.

Peddler's sales were no longer depended on for marketing the company's products and the goods were now shipped into the open market in direct competition with the English article. Peddler's trade still continued, however, reaching as far north as Canada and as far west as the Mississippi. Thus the staple output of brass buttons became quite widely used, as is indicated by the discovery of them, having the company's mark, braided in the hair of an Indian scalp-lock which ornamented a war club found in the west about the middle of the century.

In 1842, when the photographic invention of Daguerre had given rise to a large business in that field, the company made and silver-plated copper plates for the daguerreotypes. This became a very large and lucrative business and was conducted with conspicuous success. "They produced," says a historian of earlier days, "a lighter and handsomer plate than that of the English makers and fully equal to the best made by the French." Many collateral parts and appurtenances were also made. The manufacture of high grade photographic apparatus became supplemented by an increasing development of small cameras for amateur use. Later evolution tended to make the business one increasingly of non-metallic materials and, in 1889, it was separated off and taken over by the Scovill and Adams Company of New York, which had factories there and in New Haven. In its time, this was the leading camera factory of America. Eventually it became consolidated with the E. and H. T. Anthony Company, under the name of Anthony and Scovill Company—the direct predecessors of the present widely known "Ansco" Company.



S. M. BUCKINGHAM

President 1857-1861.
Born in Watertown, 1811, died 1889.
1830, Clerk in the Company Store.
1840, Member of Firm of Scovills & Company.
1850, Secretary and Director of Scovill Manufacturing Company.
1855, Treasurer.
1857, President and Treasurer.

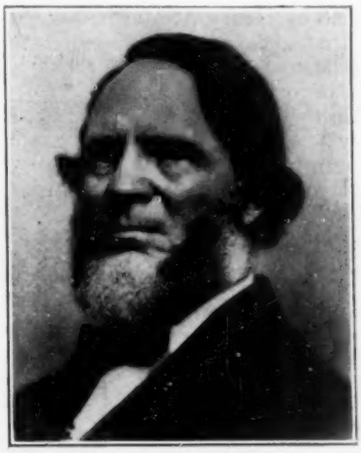
SCOVILL MANUFACTURING COMPANY INCORPORATED

In 1850, the organization became incorporated as the Scovill Manufacturing Company with a capital of $200,000. In this merger were included not only the brass mill

SCOVILL MANUFACTURING COMPANY IN 1858

and the button shop, which for the previous decade had been conducted as distinct establishments, but also a patent butt hinge factory which had been established and operated under closely related management in a neighboring town.

From that time on, the corporation's history is one of continual enlargement and growth, of larger capitalization, more employees, and ever more diversified products. The company entered largely into the manufacture of German silver, as it was then called, and became famous for its plating of copper with gold, silver or platinum, by a special process invented by a Frenchman, Eugene Martin, who entered the employ of the company shortly after 1860. The popularity of kerosene oil as a lighting fuel led to the company's designing the well-known "Queen Anne" burner, which has been one of its standard products ever since. In 1881, the company experienced a set-back in the burning of a new factory building, the loss being estimated at nearly $150,000. This was promptly rebuilt, however, and in the decade of the 80's the growth of the plant is indicated by a four-fold increase in the number of employees. The rise of aluminum into importance as a structural material gave rise to a long and interesting series of experiments by the company to determine its economic and physical availability for commercial purposes. The authoritative position thus assumed by the Company caused it to be visited by aeroplane experimenters, Prof. Langley among others, to learn the possibilities of the new metal.

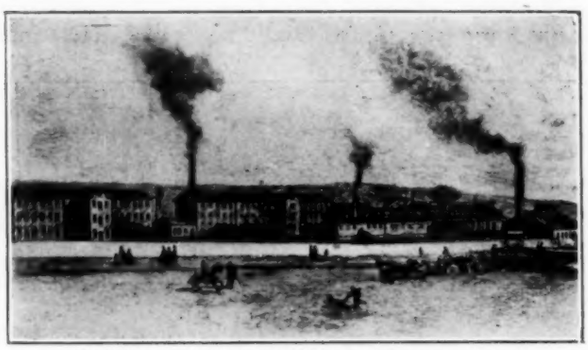


S. W. HALL

President 1861-1868.
Born in Waterbury 1814, died 1877.
1830, Clerk in the Company Store.
1852, Director.
1861, President and Executive Manager.

An interesting phase of the company's work has been its production of coins, planchets, and medals, in which are required frequently an exquisite particularity of diework as well as an especial uniformity of metal color and surface. As early as 1834, the company had begun its issue of business coins and medals, which were mostly of copper and passed freely as money. Nearly 200 different

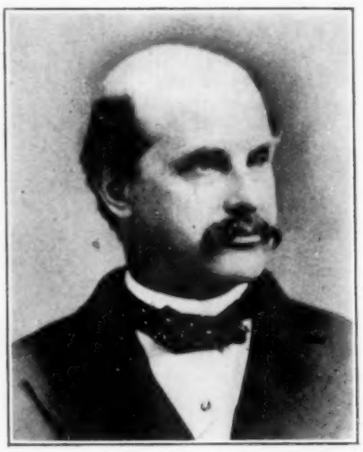
designs had been made when, in 1842, the national government laid restrictions upon this use of coin designs, and future business of the sort was restricted to contracts for this and other governments or to the issue of medals. In 1866, the company furnished the U. S. mint with the



SCOVILL MANUFACTURING COMPANY IN 1871

nickel blanks for the three-cent pieces, and since 1890 it has supplied the government with blanks for one-cent copper and five-cent nickel coins. Perhaps the most conspicuous of its achievements in this form, however, was its production of the 23,757 medals awarded by the management of the Columbian Exposition in 1893. Several of the South American and European countries have had coins made and minted at the Company's plant.

In 1903, the corporation absorbed the plant of the Matthews and Willard Manufacturing Company of Waterbury and added it to the already large equipment of the company. The plant thus absorbed was originated in 1848 by Henry A. Matthews, who manufactured saddlery, harness, carriage trimmings, etc. In 1871 he admitted to partnership Mr. W. S. Stanley, and in 1873 the business incorporated as the Matthews and Stanley Manufacturing Company with a capital of $12,000. In 1882, it was reincorporated under the name of Matthews and Willard, $100,000 capital, for the manufacture of brass ornaments, statuettes, etc. The capital was increased in 1886 to $250,000. The concern failed in 1888, and, after an auction sale, was again incorporated in 1890 with the same name and capitalization, continuing in operation until bought by the Scovill Manufacturing Company in 1903.



F. J. KINGSBURY

President 1868-1900.
Born in Waterbury 1823, died 1910.
1858, Director.
1862, Secretary and Treasurer.
1868, President.
1900, Vice-President.

In 1898, the Spanish War gave occasion for some special work on government contracts, under which began the Company's experience in munition making. Brass shells for rifles, brass parts for the elementary type of time fuse in use at that period, cupro-nickel bullet jackets, and shell cases were made during this time, which in addition to the production of loaded and assembled shrapnel shells gave an experience in handling powder which was later to prove of great value. This was followed in 1902 by the production of a considerable order of loaded one-pound shells—work which was revived under a new contract a decade later. In the years 1905-1907, however, the company entered into the most ambitious of its undertakings up to that time, in the complete manufacture and assembly of several thousand combination time and percussion fuses. Outside of the small primer, which was supplied by the government, the entire fuse was made, loaded and assembled at the plant. This work in fuses is worthy of a whole story in itself, as the number and intricacy of the parts, the exacting character of the specifications, and the complications and hazards of the loading operations all combined to make the work difficult and slow. When the production reached a mark of 85 completed fuses per day, it was felt to be a very real achievement. What incredulity would have greeted the prophecy that ten years later, the company was to do the same work with a daily output five hundred times as great!

WORK IN THE WORLD WAR

In October, 1914, the company felt the first of the demands for munitions necessitated by the great war. From that time on, for a period of a little more than four years, the requirements of the Allied Governments called for greater and greater efforts of the company until, after the United States entered the lists, the entire capacity of the plant was devoted to war work. In this period of four years, the plant output included

(a) time and combination fuses, completely assembled, to the number of over 21 million—this including the mixing of percussion powder and loading of

SCOVILL MANUFACTURING COMPANY IN 1879

primers as well as the blending of mealed powder and its loading under high pressure into the time train rings;

(b) artillery shell cases made in finished form to the number of over 19 and one-half million;

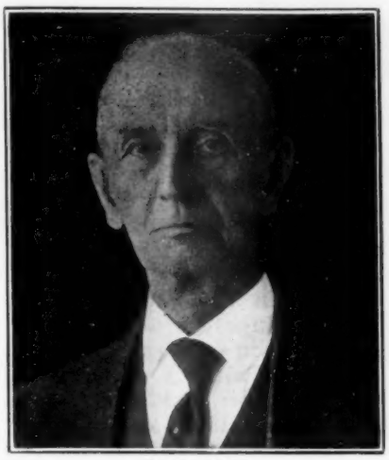
(c) percussion fuses completely assembled to the number of four and one-half million;

(d) brass cups for cartridge shells to the number of approximately two billion, and cupro-nickel cups for bullet jackets to a total of over 443 million.

The fuse work included in addition a large amount of collateral production, on other orders, so that over 14 million moisture proof tin boxes were made, as well as more than 8 million other metal covers for fuses; also, forged brass parts, for fuse bodies, caps and rings, were supplied to the number of 48 and one-half million, and brass parts for percussion fuses were turned out to a total of 131 million pieces. Similarly, more than two and one-half million brass blanks were supplied, on additional orders, for artillery cases; and miscellaneous other brass parts to the number of nearly half a billion pieces were made for munition uses, such as thong cases, belt and cartridge clips, schrapnel tubes, clean-

ing rods, copper bullets, and small parts for fuses. Finally, the button and fastener division of the plant was occupied in turning out more than 173 million military buttons and fasteners, of over 40 different styles.

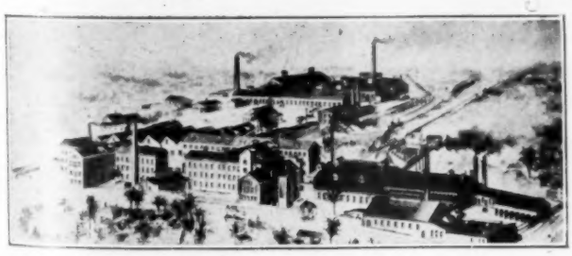
This output represented a continually rising scale of productive efficiency, the time fuse production ultimately reaching above 40,000 per day, while the artillery cases reached a maximum of 42,000 per day. Practically all of the alloys used in this work were cast at the plant and processed through the company's mills. A sample week in 1916 shows four and one-half million pounds of metal produced by the mills during the week, about three-fifths of this being flat metal and the balance in rod and wire. In the entire year of 1918, the average weekly production from the rolling mills was over two and one-quarter million pounds and this, with another million pounds per week from the rod and wire mills, made a total weekly production from all mills during that year of three and one-quarter million pounds.



C. P. GOSS

President 1900-1918.
Born in Pittsford, N. Y., 1838, died 1918.
1862, Assistant Bookkeeper.
1864, Secretary.
1866, Treasurer.
1877, Director.
1893, General Manager.
1900, President.

These figures of capacity are, of course, impressive: and there is a danger that, in the greatness of the totals, one may lose sight of the more significant fact that the real achievement was in the high quality of the material so produced. Munitions are, in the nature of the case, most exacting in their specifications, not only as to the analytical character of their metal and the precision of their dimensions but also as to their actual performance under test. If there was a higher quality of product than that produced during these eventful years, the company could frankly say that it did not know it.



SCOVILL MANUFACTURING COMPANY IN 1891

The company's investment in new buildings and equipment had been about three-quarters of a million dollars during the twenty-five years prior to 1890. In the next ten years, it was over $600,000; and in the quarter-century between 1890 and 1915 it amounted to over two million dollars. In the first sixteen years of the new century, over 60 new buildings were constructed, at a cost of over one and one-half million dollars. Then came the period of special war demands when considerable further expansion was made to accommodate the urgent contracts for our government. Readjustments following this emergency period left the company, on Jan. 1, 1923, with a capital and surplus (including reserve) of twenty-eight and one-half million dollars, a ground area of 168 acres and a floor area of two and a half million square feet, a personnel capacity of about 10,000 employees, a business of $35,000,000 per year, and a reputation sustained and broadened for quality of product and integrity of methods. It is regarded today as the largest single brass-making and brass-fabricating plant in the world.

VARIETY OF MANUFACTURES

The company specializes in brass mill products which involve particularly exacting physical qualities, such as its special spring bronze, its platers' bars for the jewelry trade, reflector brass, high speed free turning rod, an improved Muntz condenser tubing, and its cup-drawn admiralty condenser tubes.

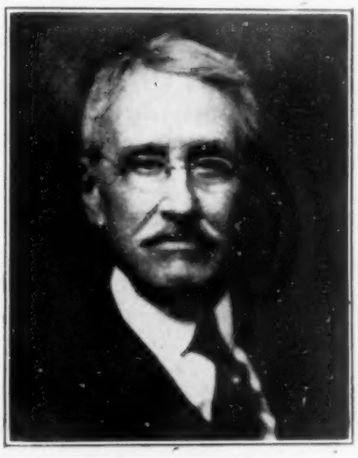
A broad classification of the company's products would include,—besides the broad range of mill products in brass, bronze, and nickel silver, in the form of sheets, rods, wire and tubes,—such groups of manufactures as follows:—the first three groups being regularly made and carried in stock, and the rest being made on order for other companies to market under their own trade name.

Screws:—Machine and cap screws, rivets, etc. The screw production runs in excess of three million a day.

Buttons:—Uniform and dress buttons, patent and sew-on buttons, of every description, and fasteners of all kinds.

Other Stock Articles:—Butts and hinges, wire buckles, collapsible drinking cups, ferrules, thimbles, etc. Sewing thimbles may be turned out at the rate of four thousand per hour.

Burners, etc.:—Queen Anne, incandescent gas, etc.; also parts for electric wiring devices, of which alone about eight thousand pieces are turned out every hour.



M. L. SPERRY

President 1918-1920.
Born in Waterbury, 1842.
1861, Bookkeeper.
1869, Secretary.
1877, Director.
1911, Vice-President.
1918, President.

Electrical Motors:—The various types of household appliances that are electrically operated. In vacuum cleaners, for example, the productive capacity is about forty per hour.

Spring Motors:—Spring motors and collateral attachments. A finished phonograph motor can issue from the productive battery every forty-five seconds.

Valves:—Among the valves of various forms and uses, the radiator valve production reaches about three thousand per day.

Novelties:—Toilet articles and containers of the widest variety.

Blanks:—All varieties of clock and watch parts, as well as bicycle and automobile accessories, also eyelets,

caps, shells, coins, medals, and formed wire specialties. The Eyelet Room issues about four million pieces per day.

Screw Machine Products:—Small parts made from brass, bronze, nickel silver, steel, aluminum, and other metals.

Munitions:—Shells, bullet jackets, fuses, and explosive accessories.

Castings:—Brass and aluminum forms, both forged and cast; plumbing and bedstead trimmings, etc.

In all these divisions, the continually changing variety of product and its wide distribution in world markets justify the company in feeling that, on its products, as on the British flag, the sun never sets.

It is estimated that, during the last 60 years, an average of about 100 different articles, not including the separate elements of complete assemblies, have been added annually to the extensive output of the company's manufacturing department. As an index of the scope and extent of this department of the plant, one may note the growth of the subsidiary division which is exclusively engaged in preparing the machines and tools for use in the various productive processes. In 1910, there were employed over 300 machinists, die and tool makers, etc., for this work. In 1915, they numbered over 500; and they reached in 1920 the maximum of 850.

Although brass-making is one of the oldest of civilized arts, it is only in the most recent history that its processes have been standardized in accordance with technical understanding and control. In Casting Shop practice, for example, two marked improvements have been introduced within the present generation,—to the advantage of both economy and quality of the metal produced. The old type of pit fires, where the crucible is surrounded by live coal until lifted out for pouring, has largely given way to oil-burning furnaces in which there is a much better control of heat, an exemption from ashes and dirt, and the possibility of handling a notably larger unit of metal. These oil-fire crucible furnaces have, in their turn, already been displaced by electric melting furnaces, which permit an even closer control of temperature and a better mixing, while retaining the larger tonnage unit and protecting this from various injurious gases during the process of melting. There has resulted not only a distinct improvement of quality,—which reacts in a closer and more efficient control throughout all the processes of brass making—but also a reduction in the amount of labor required per ton melted, so that the present labor cost of brass is probably less than one-half what it would have been if the original methods had continued in effect. Closely related to this, is the recent development of analytical control,—both in chemical and in metallographical analysis,—whereby the exact character of the metal is determined to a degree that perfectly indicates its suitability for the uses desired.

CHANGES IN MANAGEMENT

During the hundred and twenty years covered by this brief history, several changes of ownership and management have been mentioned. It may be of interest to summarize them here.

1802. Abel Porter & Company.—(Abel and Levi Porter, Silas Grilley, David Clark. Levi Porter withdrew in 1806.)

1808. David Hayden joined the partnership, bringing his experience of button-making as practiced in Massachusetts.

1811. Leavenworth, Hayden and Scovill.—(Frederick Leavenworth, David Hayden, and James M. L. Scovill, who had bought the business after the dissolution of the original firm.)

1827. J. M. L. and W. H. Scovill.—(William H. Scovill buying a half interest after Leavenworth and Hayden had sold out.)

1836. Scovills and Buckingham.—A new establishment in a neighboring town, for manufacture of butt hinges; absorbed in 1850.

1840. Button business organized as Scovills & Company—(with S. M. Buckingham and Abraham Ives as new partners).

Mill business continued as J. M. L. and W. H. Scovill,—for manufacture of rolled brass and brass wire.

1850. Scovill Manufacturing Company,—consolidation and incorporation of button, mill and butt businesses.

James M. L. Scovill, Pres., Capital $200,000

1857. Scovill M. Buckingham, Pres., Capital $300,000

1861. Samuel W. Hall, Pres., Capital $300,000

1868. Frederick J. Kingsbury, Pres., Capital and Surplus $917,000

1900. Chauncey P. Goss, Pres., Capital and Surplus $2,150,000

1918. Mark L. Sperry, Pres., Capital and Surplus $30,905,000

1920. Edward O. Goss, Pres., Capital and Surplus $29,383,000

SCOVILL MANUFACTURING COMPANY—EAST PLANT BUILT DURING THE WAR

The following table shows the financial development of the company by decades since its incorporation:

	CAPITAL	SURPLUS, INCLUDING RESERVE	DIVIDENDS PAID DURING DECADE
1850	$200,000	....	....
1860	300,000	not recorded	$300,000
1870	350,000	$670,000	1,040,000
1880	350,000	507,000	788,000
1890	390,000	1,045,000	455,000
1900	1,600,000	550,000	2,217,000
1910	4,051,000	2,302,000	2,651,000
1920	5,000,000	24,383,000	19,376,000

In 1922, the Capital was increased to $15,000,000, the increase being transferred from the Surplus.

E. O. GOSS

President since 1920.
Born in Waterbury, 1865.
1888, Mechanical Engineer.
1898, Director.
1900, Assistant Treasurer.
1911, General Manager.
1918, Vice-President and Treasurer.
1920, President.

A further index of the company's development may be found in the number of employees. From 13 in 1802, these had increased to 190 by the date of the company's incorporation and remained at about this figure for the decade of the fifties. By 1870, they had risen to 538, only to be set back by the depression of the seventies, to 339 in 1880. In 1890, they had increased to 1,200; by 1900 this had become 2,000, and by 1910 even that had doubled. During the war emergency the total rose to nearly 15,000, but of this not more than 10,000 may be regarded as normal capacity. Immigration has reflected itself in the number and variety of languages spoken among the employees. There are, however, many representatives of the old-time Yankee personnel, and the company has been distinguished by the number of employees who have been in its service over a long period; many for a generation and not a few for over a half-century.

PRESENT OFFICERS

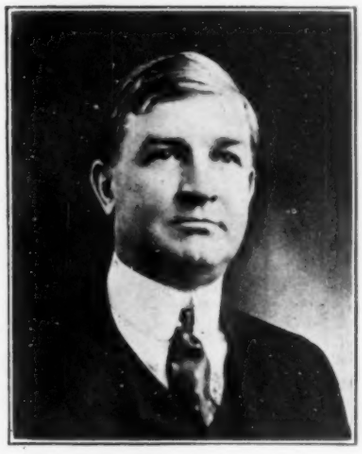
The present officers of the company are Edward O. Goss, President and General Manager. John H. Goss, Vice-President and General Superintendent; Leavenworth P. Sperry, Secretary and Comptroller; Clayton M. DeMott, Sr., Treasurer; Frank J. Gorse, Assistant Treasurer; Thomas B. Myers, Assistant Secretary. The directors of the company include the first four named above, with Mark L. Sperry, Chauncey P. Goss, Jr., Frederick J. Kingsbury, William E. Curtis, and W. Shirley Fulton.

L. P. SPERRY

Secretary since 1919.
Born in Waterbury, 1883.
1903, Assistant in Steam Dept.
1918, Director.
1918, Assistant Secretary.
1919, Secretary.

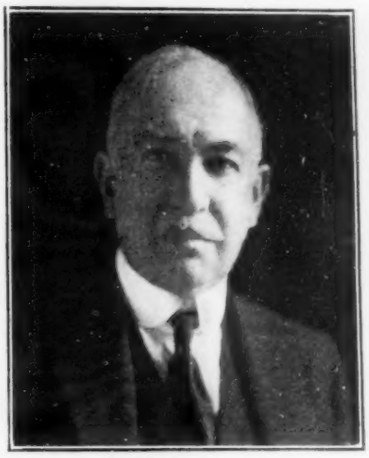
The company's factory and home office in Waterbury are represented by branch offices in New York City, Chicago, Boston, Philadelphia, Cleveland and San Francisco.

The plant, today, shows many outward signs of the development which it underwent, both intensively and extensively, during the stressful years of the war. Yet it is a fact that it was, in its modern methods and equipment, in perfect readiness to assume such an extra load when the war broke out; and its subsequent enlargement of buildings and personnel proceeded along the lines of administrative policy and operating method which had already been tried, proven, and established. The fact goes far to explain the accomplishment of the five years that followed. No small part of this accomplishment, moreover, was in the material expansion which the company had to effect in those years. An entire plant,—casting shop, mills and manufactory—was laid out, constructed, equipped, and articulated with the parent organization, not only without interrupting the production schedule but with a surprisingly prompt reaction in enlarged output. And then suddenly, in a single morning, the war came to an end. New problems at once arose,—problems of personnel, of material adjustment and disposition, of future policy. The federal government, which had been the great customer of munition works such as these, entered readily and fairly into reasonable arrangements for the proper protection of the greatly multiplied working personnel; and in due time the disposition of war materials, both raw and finished, was provided for. There remained the problem of future policy—of finding the way back into the commercial field and developing a use for the magnified areas and capacities. It was a problem that had to be solved by the company alone,—no outside power could help,—and it involved something more than a mere "return to normalcy." How it was solved—in what many and various ways the productive power and efficiency of the huge plant were applied to the world's work—has already been shown. The belief of its management has always been that the company's efficiency and success lay in its continual development and growth; and it is with that attitude that it operates today and confidently approaches the future.



J. H. GOSS

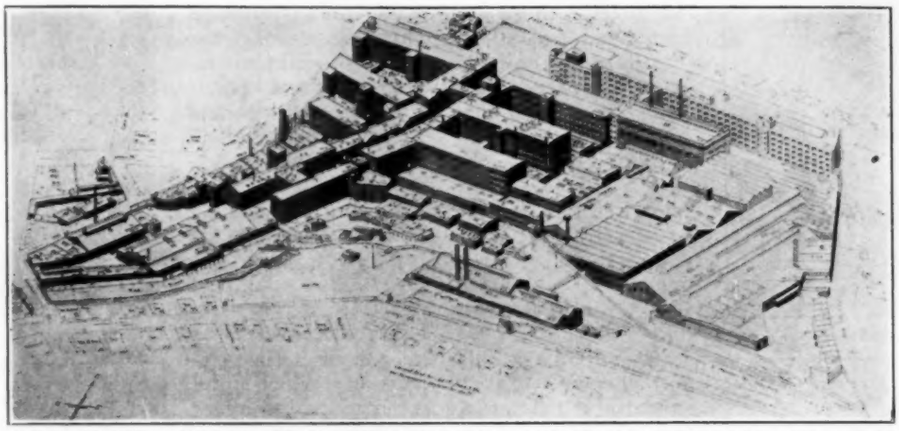
Vice-President since 1919.
Born in Waterbury, 1872.
1894, Apprentice in Tool & Machine Department.
1905, Superintendent of Burner Department.
1906, Director.
1908, Superintendent of Manufacturing Department.
1909, General Superintendent.
1918, Secretary.
1919, Vice-President.



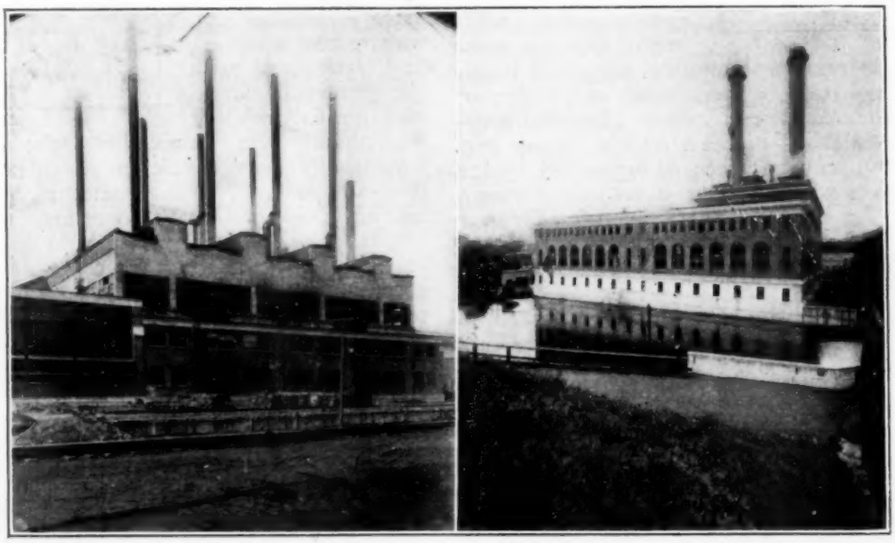
C. M. DeMOTT

Treasurer since 1919.
Born in Perinton, N. Y., 1860.
1879, Shipping Clerk in Mill.
1908, Director.
1913, Assistant Secretary.
1918, Assistant Treasurer.
1919, Treasurer.

Scovill Manufacturing Company in 1923



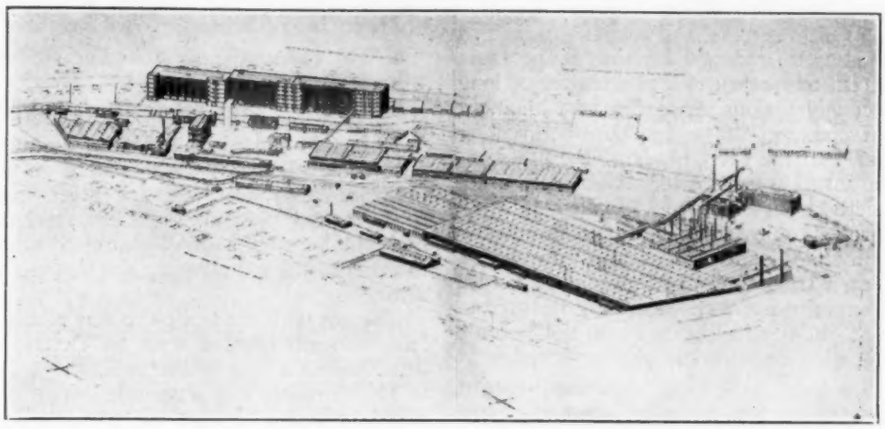
WEST PLANT: ON SITE OF ORIGINAL FACTORY: SHOWING OFFICE, MANUFACTURING DEPARTMENT, WIRE MILL AND ROLLING MILL



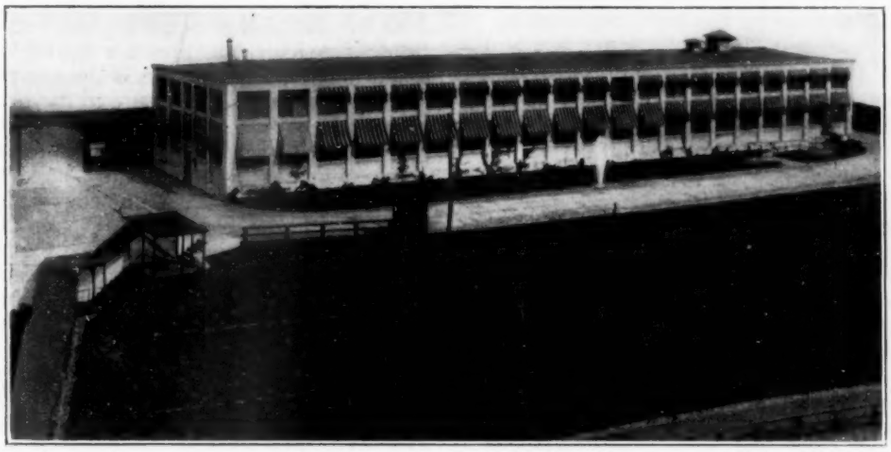
CASTING SHOP POWER HOUSE

EMPLOYEES' COUNTRY CLUB

Scovill Manufacturing Company in 1923



EAST PLANT: BUILT DURING THE WAR: SHOWING SCREW DEPARTMENT, TUBE MILL, ROD MILL, CASTING SHOP, POWER HOUSE AND CHEMISTRY AND TEST BUILDING



CHEMISTRY AND TEST DEPARTMENT

SCOVILL HOUSES OWNED BY EMPLOYEES

Hot and Cold Working Brasses

Some Interesting Figures and Charts Resulting from Experimental Work on Various Brasses

Written for The Metal Industry by M. G. KORSUNSKY, Metallurgical Engineer*

The ability of brasses to undergo forming by pressure and tension at different temperatures was a matter of long and contradictory considerations since the very moment of the invention of common brass, as manufactured by the calamine process. In the early times of the brass industry the wrought forms were not too extensively used, and the plainest methods of cold work applied to small sized cast plates proved quite sufficient. No doubt can exist, that once in awhile some of the early copper-mill and machine-shop men tried to forge the common brass when red, but the experiments were generally unsuccessful. The practice of hot-forging brass could not become established, and this alloy remained known as hot-short.

The advent of the large sea-going steamers brought with it the question of finding an alloy cheaper, more durable and harder than red copper of those days, and in addition possessing the same, or even a higher degree of workability at high temperatures, as the red metal displays. We know how this problem was solved by Sir Gerard Muntz, the inventor of the high zinc brasses.

The latter alloys suffered almost the same fate as the low-zinc common and standard brasses, though in the opposite direction. They were somehow proclaimed to be cold short, and any effort to act contrary to this prefixed opinion was beforehand considered as something to be classified between common insanity and a deliberate insult to His Majesty.

For a long time brasses were classified by their belonging either to the group of the cold or hot workable alloys respectively. It was not until long after the scientific metallography of brasses was created that the promoters of this science expressed their doubts about the truth of these definitions.

The possibility of cold working high zinc brasses in such a degree that a reduction of thickness amounting to almost 50% was achieved without annealing, might have been well known for quite a time to the more progressive manufacturers, but no scientific study of the question was published previous to the article of F. Johnson which appeared in the Inst. of Metals Transactions for 1920 (v. 24).

The possibility of hot-working low zinc brasses was decidedly claimed by some of the members of the same institute even at earlier occasions, and from time to time it was rumored that certain brass mills introduced hot rolling for the manufacture of large sheets of standard brass.

Two investigators busied themselves with the simplified but still intricate problem of plain compression. They were Messrs. Fr. Doerinkel and Jul. Troeckels, and their work was accomplished at the plants of Copper & Brass Mills of the Hirsch Corp., Eberswalde.

The questions which they endeavored to answer were:

1. The maximum reduction which a particular brass can bear before exhibiting cracks.
2. The work per unit of the initial cross section which the alloy will absorb up to the maximum reduction.
3. The comparative amount of work which different brasses will require to undergo a certain equal amount of reduction suitable for industrial purposes (for instance 50 per cent reduction).
4. The stress of resistance to plastic deformation which different alloys exhibit at the beginning of said deformation.
5. The comparative hardening, or the amount by which this stress grows for a unit of reduction (1%).

* Research Metallurgist, Union Carbide & Carbon Corporation, Long Island City, N. Y.

METHOD OF INVESTIGATION.

A certain test piece (18 mm. diam. x 36 mm. height) cut from rolled stock was placed in a heavy cylindrical pot cast from heat resisting steel, and covered with a heavy round plate of the same steel, which so fitted in the cylinder with a small clearance between the plate and the wall of the pot allowing the plate to move without friction.

The pot with the test piece was placed upon a refractory base and surrounded with an electric furnace, a ribbon of nichrome acting as the resistor.

The furnace was suspended from a crane, so that it could be removed with the greatest ease leaving the pot quite free.

The temperature was measured with the thermoelectrical pyrometer.

After the desired temperature was attained, the pot with the test piece was quickly put under the compression head of a hydraulic pressure testing machine. It took about 20 seconds to compress the test piece to the desired size, by applying the pressure to the heavy plate covering the test piece.

The machine was fitted with a self-recording attachment, so that the momentary pressure and the corresponding deformation were simultaneously recorded in form of a curve.

The plate of steel reposing upon the test piece had a resistance so superior to the resistance of the test piece itself, that its own deformation was of no influence upon the results of the experiment.

The test pieces were immediately after the deformation thrown into a calorimeter, to make sure that the temperature did not change perceptibly during the experiment. This test showed that in no case did the temperature go down, but that the heat developed from the plastic compression work kept the test piece somewhat over the starting temperature.

LAYOUT OF WORK.

The first series of experiments had to answer the third question and to this purpose test pieces were subject to a certain maximum load of compression.

In the obtained graphics the part corresponding to a reduction of 50% was planimetered and the work spent for the deformation calculated.

At least four test pieces of each alloy were studied, and the range of temperature from 20° C. to 800° was covered with intervals of 100°. The data obtained from the individual graphics coincided extraordinarily well.

In the second series of experiments the pressure load was initially pushed so far as to certainly produce cracks in the test piece. Then the load was stepwise lowered for each new piece until the limit of reduction without failures could be ascertained, and then proved upon additional test pieces.

In the third series the work was done in such a manner that the amounts of energy required for different degrees of reduction were exactly determined. A mathematical equation connecting the amount of energy with the changing resistance of the test piece and with its changing dimensions was developed under the presumption that the "hardening" effect was proportional to the reduction. The

unknown factors of the initial resistance and the characteristic hardening were then found from the numerical equations, and tested for the whole range of reductions for a few alloys at certain temperatures.

ALLOYS SUBJECT TO INVESTIGATION.

The range of investigated alloys was not systematically chosen, and the investigators limited themselves to a few commercial compositions. They were:

1. Electrolytic copper.
2. Low tin bronze (trolley cable) with 1% tin, traces iron.
3. Red brass, 88:12; with 11.7 Zn; .3 Fe; 15 Pb.
4. Red brass, 85:15; with 15.1 Zn; .10 Pb.
5. High Standard, 72:28; with traces of iron and lead.
6. Condensor brass 70:29:1; with 30.7% Zn; 1.0 Sn.
7. Common brass, 67:33; with 33.4 Zn; .2 Pb.
8. Intermediate, 63:37; with 37.8 Zn; .1 Pb.
9. Extrusion brass, 58:42; with 42:2 Zn; .4 Pb; .1 Sn.

RESULTS OF INVESTIGATIONS.

The original investigators put their results into the form of tables and numerous diagrams, with figures related only to the size of the test pieces they experimented with. From these figures and diagrams the writer deemed it possible and desirable to draw three idealized space-diagrams presenting the comparative influence of composition and temperature upon the whole range of commercial brasses (up to 42 per cent zinc) and for the total range of temperature between 0 and 800° C.

EXPLAINING THE DIAGRAMS.

Fig. 1 shows the maximum reductions which the brasses can undergo at different temperatures.

We see that pure copper remains the most ductile member of the whole series at any temperature. Its plasticity increases continuously from the room temperature, when it equals 71 per cent to 800° when 92 per cent reduction is easily attainable.

The plasticity falls with the addition of zinc but there is no simple relation between the zinc content and the decrease in this property. A few per cent of added zinc bring a sharp decrease in ductility but the latter remains fairly constant from 10 to 30 per cent zinc. There is a new sharp decrease in ductility after 34 per cent zinc. Nevertheless, even the 58.42 brass allows a reduction of 38 per cent in cold pressing.

The general trend in the influence of composition upon plasticity remains the same up to 200°, but the decrease in this property from copper to low zinc red brass becomes sharper, while its decrease from the alpha brasses to the high zinc brasses becomes just apparent. At 200° the latter can undergo a reduction of 50%.

The sharp decrease in plasticity brought about by small zinc additions becomes accentuated between 200 and 500° C. At the latter temperature the plasticity of red brass of 85:15 composition falls to 50 per cent, while at room temperature it amounted to 61 per cent.

The mentioned composition is, however, the one of minimum plasticity. Additional zinc content raises it quite strongly and at 500° C. or at the beginning red heat, the 70:30 brass is as plastic as copper.

This plasticity, however, undergoes another decrease in the mentioned range of temperatures with an increase in zinc and at 500° the 62:38 brass has a minimum ductility of 62 per cent, which goes up only slightly for the 58:42 brass.

The sharp maximum of plasticity at 70% copper and both sharp minimums at 85 and 62 per cent copper, while not completely disappearing, become quite flat at still higher temperatures, when all of the brass exhibits an excellent plasticity (malleability).

AMOUNT OF WORK WHICH THE BRASSES WILL ABSORB.

Fig. 2 represents the comparative amount of work which can be absorbed by the different brasses without failing under the pressure. Here we see that pure copper needs less and less work, for the maximum reduction with the increase in temperature. It seems that this amount of work is almost a straight line function of temperature. The comparative amount of work absorbable by copper at the room temperature is taken equal to a unit

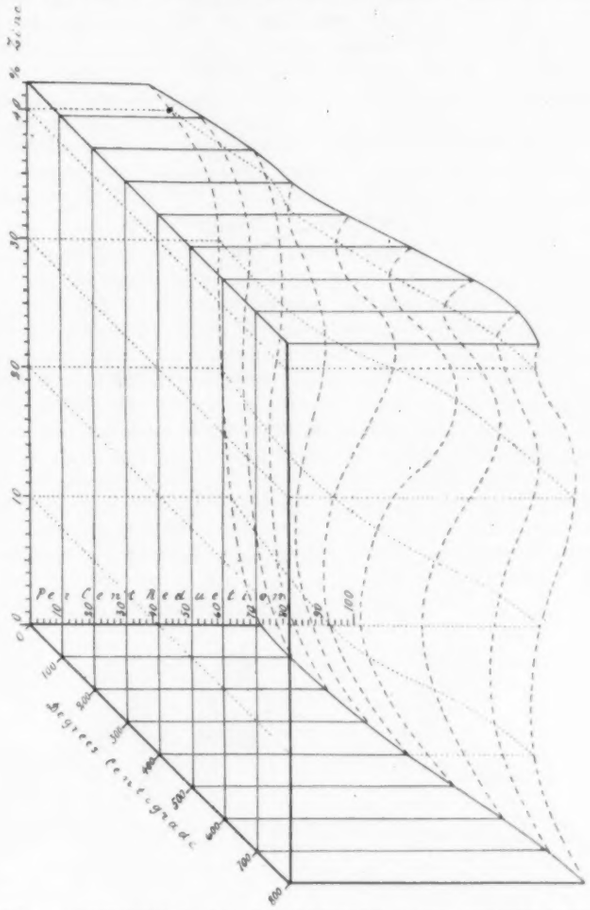


FIG. 1. INFLUENCE OF COMPOSITION AND TEMPERATURE UPON THE MAXIMUM PLASTICITY OF BRASSES

upon the diagram. This unit amounts approximately to 5,150 foot-lbs. per cubic inch.

This diagram shows clearly that zinc increases the amount of work necessary to produce the maximum reduction. This means that zinc makes the brasses stronger and more difficult to work. The 67:33 brass is clearly shown to be the strongest alloy in compression.

This maximum of absorbable work falls steeply down to the 58:42 brass; there is not much work necessary to produce the maximum reduction in the latter, far less than expected according to its figure of reductibility. Here we have a clear presentation of the comparative weakness of the high zinc brasses if subject to cold compression.

Somewhere after 100° the picture undergoes an enormous change. The work absorbable by the low zinc brasses falls far out of proportion with the simultaneous decrease in plasticity. The minimum of ability to absorb work seems to remain almost constantly at the 87:13 composition. The latter brass becomes a decidedly weak alloy and while it may be worked under pressure at any temperatures, the reduction must proceed slowly and carefully.

Brasses higher than 13% in zinc exhibit a decided increase in work absorbing capacity just as they show

an increase in the maximum reduction. Brasses of about 28 to 30% zinc possess both qualities in a high degree at any temperature. They always remain far stronger than copper, ask for an application of heavier pressures, and, as it will be shown from diagram III, tend to harden greatly, even at high temperatures.

From the 70:30 composition there is a more or less abrupt fall in ability to absorb work and in the work necessary to produce reduction to the alpha brasses of 62:38 class. After this point of composition is reached conditions hardly change down to the 58:42 brass. The little work required to produce the comparatively large maximum reduction in the alloys of the latter range at high temperature explains why they are so excellently suited for extrusion. Copper for instance would ask for 8 to 18 times and 70:30 brass for 10 to 25 times more power to be forced through the extrusion die.

AMOUNT OF WORK NEEDED FOR A 50% REDUCTION.

Fig. 3 answers primarily to the question 3. It gives us the comparative amount of work needed to make the brasses undergo a reduction to 50%. The scale is the same as in Fig. 2. At medium temperatures of say 400° C, copper remains the softest metal, and there is a continuous rise in resistance to plastic compression up to 30% zinc. It takes two times as much work to inflict the 50% reduction upon the 70:30 brass as must be put into copper at the room temperature. This big difference in workability does not, however, remain constant and at 400° it amounts to 60% only. From this temperature the difference in the amount of energy of reduction becomes less

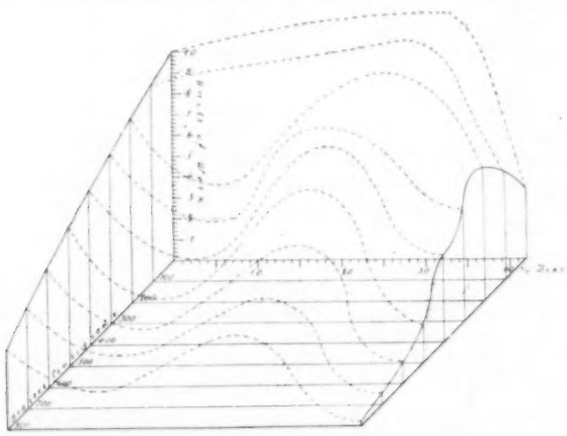


FIG. 2. COMPARATIVE AMOUNT OF WORK. ABSORBABLE BY BRASSES OF DIFFERENT COMPOSITION AND AT DIFFERENT TEMPERATURES WITHOUT FAILURE

outspoken for the whole range of alpha brasses, and the maximum toughness gradually moves to the 80:20 composition. At 700° the energy requirements for this range become almost constant.

The amount of work needed for the 50% reduction at low temperature falls very abruptly from the 67:33 composition to the 63:37 one. It seems as if the saturated alpha brass becomes weaker and its grains tend to slip under a much lower quantity of work. The presence of beta grains tends to prevent this slippage and the amount of work which is necessary for this reduction increases continuously with the increase of this component of brass structure.

After 400° C the quantity of beta grains produced in the brasses of the 37 to 33 zinc range increases so, that there is no appreciable lowering in the amount of needed work. This lowering reappears, however, in the high zinc brass 58.42, where the quantity of the remaining alpha grains is greatly decreased.

After 500° C the amount of energy needed for the 50 per cent reduction in the 58:42 brasses is continuously falling, which could be foreseen, as this brass represents now an almost pure beta component, which softens quite gradually. It takes only the fourth part of energy which is needed for a heavy (but not the maximum) reduction of copper to equally reduce this high zinc brass.

The same diagram (3) answers also to the question

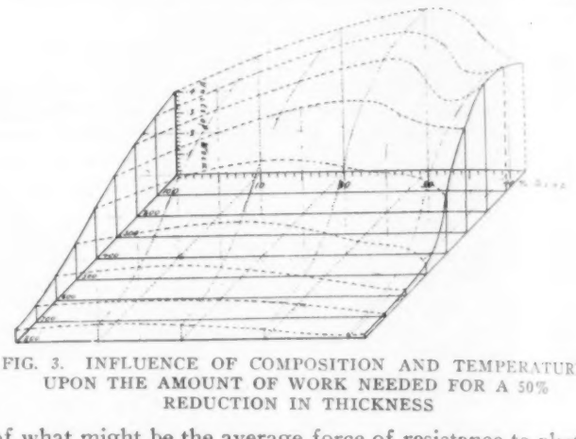


FIG. 3. INFLUENCE OF COMPOSITION AND TEMPERATURE UPON THE AMOUNT OF WORK NEEDED FOR A 50% REDUCTION IN THICKNESS

of what might be the average force of resistance to plastic compression between 0 and 50 per cent of reduction. The experiments of the German investigators showed that for almost all brasses of the investigated range, hardening is proportional to the reduction up to approximately 60 per cent of the latter. Therefore, the arithmetic average of the initial and the final force of resistance (at 50 per cent reduction) will fairly represent the average resistance offered by the particular brasses up to 50 per cent reduction. This means in the first line, that the average resistance must be proportional to the absorbed work, and so Fig. 3 serving to compare the work absorbed for a 50 per cent reduction can serve also to compare the average resistances to plastic compression. For red copper at room temperature this resistance (in round figures) will be around 36.000 lbs /inch².

INITIAL RESISTANCE AND HARDENING

The same investigators developed a number of data, giving the initial specific resistance and the hardening effect for red copper, the 72:28 brass and the 58.42 high-zinc brass. These data were not, however, so exhausting in scope and any interpolations for brasses of other compositions would enormously lack in certainty. We are compelled therefore to produce at this spot only a table containing data derived from the work of the German investigators.

TABLE OF INITIAL RESISTANCE TO PLASTIC COMPRESSION, AND OF HARDENING EFFECTED BY EACH 10 PER CENT REDUCTION FOR COPPER AND BRASS (IN POUNDS TO INCH²)

Tempera-	Copper		72:28 brass		58:42 brass	
ture	In. res.	Hard-ng	In. res-ce.	Hard-ng	In. res-ce	Hard-ng
20°	25.200	3.720	53.200	5.320	....	....
100	25.200	3.950	57.400	3.920	....	....
200	18.200	3.720	50.400	3.950	29.400	8.700
300	16.800	3.000	50.000	2.800	....	....
400	15.400	2.500	37.800	2.200	....	....
500	12.600	1.850	....	....	....	....
600	7.000	?				
700	7.000	0.000				

The above table allows to draw only a few conclusions. It shows first, that at 700 degrees, or even a little lower, all brasses are practically free from hardening effects, in other words they self-anneal during work. Then we may see, that hardening remains for copper in fairly constant relation to the initial resistance, while additions of zinc

lowered this relation greatly at room temperature and still more so, when the temperature rises. The high zinc brasses exhibit a comparatively enormous hardening effect, which is the real cause of the difficulties experienced when cold working these alloys.

CONCLUSIONS

The foregoing shows us, that inasmuch as work under pure pressure conditions is concerned:

1. All brasses beginning from copper and ending at the 58:42 (and even somewhat richer in zinc) composition can be pressed, and drop forged at any temperature (of course below the range of zinc evaporization).

2. The application of the pressing load or of the live force of the falling hammer must be individualized for each particular brass. No attempt to work all of them in the same condition, or by men accustomed to some particular conditions, can be successful.

3. There is probably a great influence of the time factor, that is of the comparative amount of time needed to successfully produce a suitable reduction under a given load, or reversed.

Bending Brass Pipe for Rail Work and Copper Coil Plates

Written for The Metal Industry by P. W. BLAIR, Mechanical Editor

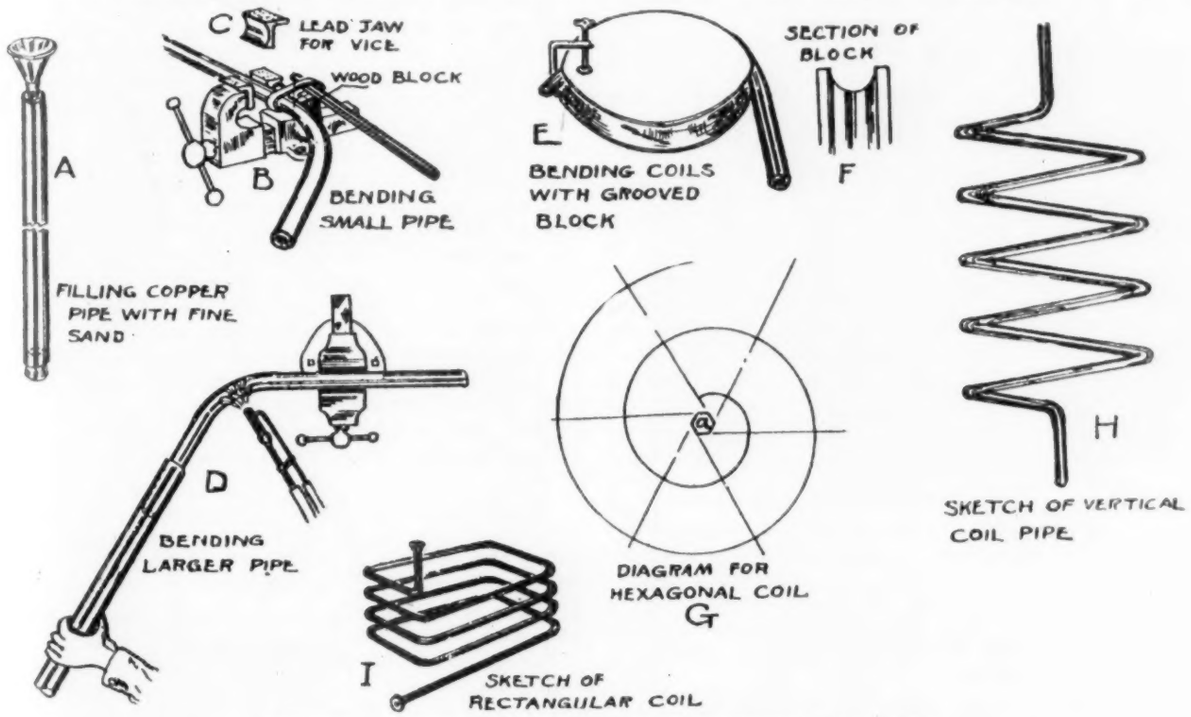
The bending of brass and copper pipe is very simple when undertaken by the right methods. As brass pipe in the sizes ranging from 1½" O. D. to 2" O. D. is largely used for railing work and bent to specifications, the methods employed are mostly hand bending. In shops specializing on rail work they have regular bending machines in which almost any shape of the curves or radius can be easily produced so long as it is round and still holds the pipe uniform.

Pipes are best bent by filling with rosin. The rosin is heated and one end of the pipe is plugged or stopped up, and the pipe is filled full of rosin, and permitted to cool. When set, the pipe may be bent wherever desired. After being bent the pipe is heated gradually from the top end toward the further end, and this gradually melts out the rosin. However, in general practice, sand is commonly used as a filler for binding brass and copper tubing. At A is shown a sketch of filling a pipe with sand. The sand should be quite fine and should be set and compacted well in the pipe. This is done by tapping the pipe with a mallet as the sand is being filled in. When filled the top is corked and the bend can be made as at B, in an ordinary shop. Lead jaws are cast of a similar radius to the diameter of the pipe as at C, and these are set in the vise for holding the pipe secure.

Then by means of the band iron link, or a piece of rope, and a block of wood, with a bar set in the position shown, the bend is made gradually. On larger pipes a torch is placed in the position where the bend is to be made at D. This helps to make the metal more flexible, and by tapping it lightly, as the bend is being made, no trouble will be met with.

The making of coils where we have a helical coil as at H is done with a sort of grooved brick as at E and F. In this way as many revolutions are made as are required and afterward the space between the revolutions are averaged up and adjusted so that a uniform rise and curvature is maintained.

Where coils are to be made to suit a spiral as at G, then the spiral is designed from the centre either by means of a triangle, a square or hexagon.



SKETCHES OF OPERATIONS INVOLVED IN BENDING BRASS PIPE

By using the various corners of the hexagon A, the spiral is described making as many revolutions as desired. After this the copper tubing is bent either with a bending block as at E, or in a vise.

As the pipe is being worked it is occasionally fitted to the working drawing G, so the lines will be followed. Where a rectangular coil is met, then the bends are made to a 90 degree angle and the pipe is pulled apart to give it the coil effect.

The Shop Suggestion Box

Is This Method of Solving Shop Problems a Success, and If Not Why Not?

Written for The Metal Industry by WM. H. PARRY, Foundryman

Many manufacturing plants have in the last few years installed, in a conspicuous place, a suggestion box in the hope that the men employed by them would offer written suggestions, sketches, or even elaborate drawings in the hope that their ideas would bear fruit of two varieties, one to increase shop production, the other to increase the flow of the coin of the realm into their own pockets. Theoretically the suggestion box idea ought to succeed, as it is supposed to stimulate the rank and file particularly, to bring forth new schemes that will quicken and possibly cheapen the cost of output without in any way injuring the quality.

The "modus operandi" followed in all shops is pretty much the same. The men intrusted to make the selections of value are composed of representatives of the workmen, the foreman, the executive and main office forces, though why the main office element is chosen has always been a mystery, as most of this gentry could not possibly judge of the merits of anything mechanical, unless it would appertain to advanced pen wiping. In any event, this board of appraisers as we will call them, do at stated periods open the box, and if they find anything in it proceed to adjudicate on the merits of the suggestions.

Now, far be it from me to "knock the box," as one would say of those not in its favor, but the net results are very apt to be disappointing, and the reasons therefor are not as numerous as one would suppose, but are nevertheless very convincing. Suggestions from minds not trained in straight and clear thinking, are seldom of value. About ninety-nine per cent of factory employees never allow their thoughts to dwell on any subject more serious than baseballs pools, crap shooting, cabarets, horse-racing and pay day, so it is not to be expected that any helpful idea will emanate from any such source. The remaining one per cent do, however, make suggestions at times, not always of value, it is true, but showing the right spirit of cooperation.

There is this to say regarding the results of the first adjudications of the board of appraisers. If they be unfavorable to all suggestions the functions of "the box" will wilt thereafter to a degree best described as "nothing doing." It will be noted that the nature of what few suggestions are offered will vary amazingly, ranging from the elimination of all time clocks and substituting therefor the old brass check to be hung on a nail, to the adoption of the five-day week on the grounds that more work can be produced in forty hours than is possible in forty-four or forty-eight. The strictly mechanical improvements advanced through the suggestion box are usually of the crudest kind and would need the combined efforts of a battery of mechanical engineers to beat them into a workable shape, while those offered of an inventive turn are so worthless as to be pitiful.

It is not held here that the suggestion box has proved to be a failure when given a fair and square trial, and the working force intelligent enough to offer sensible ideas, but the very nature of the scheme is anything but productive of harmony. In fact, has been the means of disrupting many otherwise peaceable shop crews, because the awards and rejections of the appraisal boards did not meet with their approval. A couple of actual happenings along these lines will best convince Doubting Thomas's that all is not gold that glitters in the suggestion box.

A melter (and a good one) suggested the use of compressed air at eighty pounds pressure to jet on the bath of metal in an air furnace in conjunction with fuel oil, to assist the more rapid melting. His ideal was to steal enough air from the main line in a three-quarter inch pipe, thus in no way crippling the main supply used to run riddlers, moulding machines, rappers and chipping hammers. When it was pointed out to him the volume of air would be insufficient, and that the capacity of the compressor had reached its limit long ago, he was not convinced in the least, even when told that it was very bad practice to jet a mixture of air and oil directly on metal being melted.

Just to show a spirit of fair play to him, however, the necessary piping was installed, with all the frills such as pressure regulators, valves, tuyere, and oil boosters, etc. To make a long story short, the whole shooting-match turned out to be a "bust" so complete, that the air in the reservoir petered out in a very few minutes. The oil unaccompanied by air enough to complete combustion, was the means of filling the neighborhood with enough black smoke to call out the fire department, and all the machinery depending on the air supply came to a dead stop.

Outside of these happenings the trial was a huge success, in proving that the idea suggested had nothing whatever to commend it, except the expression on the melter's face when his dreams of wealth were dispelled by this cruel lack of results. He blamed everybody and everything for the failure except himself, and was as sore as a boil because further trials of his smoke-making device were discontinued then and there.

A bench hand who was not a world beater as such, was responsible for a suggestion to save metal by reducing the effective and necessary area of a screening device, lost all control of himself when told that his idea was a fine example of a step backwards, and threatened to take his case to a higher tribunal where he could get a showdown. He was told to go ahead, and that the time consumed by the trip to headquarters would be paid for at his usual hourly rate, plus lunch money and carfare. So he made the pilgrimage and precipitated as fine a row as ever occurred between office and factory, which was not settled until a sample made to suit him was tried by exhaustive tests, which again proved that the device was a joke.

Did this man take his defeat as a good sport takes his medicine? Yes, he did—not. He became so grouchy that the paymaster had all but to use a long-handled tongs in handing him his pay envelope.

There is another angle to the suggestion box question that does not make for its success, and that is the all-too-prevalent suspicion among shop men that their suggestions will get no further than into the heads of the small bosses, only to turn up later as the "original" ideas of these pettifogging supervisors. That this suspicion is justified, is the result of decidedly unfair treatment accorded by the board being improperly constituted, by not having shop men acting as a part of it, or being influenced by the bosses belittling demeanor towards all shop men's ideas, and their presence on the board of appraisers. An instance of this species of robbery is worth noting, as proving just how small and mean some bosses can be.

Many hundreds per day of small spur gears were

wanted, and as they had to be machined on both sides so as to stack up in groups of fifteen or so to be set on the gear hobbing machine, the labor necessary to face both sides meant a double chucking on the lathes by several operators in order to get the necessary production. As this was the longest operation of a series, the output was restricted to the speed of these men, and if one or two of them failed to show up for a day or so, their absence meant a break in the continuity and output. A toolmaker employed as a repair hand in the gear department, had studied this problem and had invented a machine to face off both sides of the gear blanks at one chucking. He submitted to the tender mercies of the appraisal board a full set of drawings of his invention and was notified in due time that after giving his drawings the once over the board had decided that his ideas were not practical, and the making of the machine would cost too much money anyhow.

After waiting for a reasonable length of time, the toolmaker asked for the return of his drawings and an alleged search revealed that the whole set had mysteriously disappeared. From that time on the peace of mind of that toolmaker, while in that shop at least, became the reverse, and in a short time drove him out to seek other employment. There were two culprits equally guilty in this instance. One was the superintendent, the other the foreman toolmaker, and when these two worthies decided that the coast was all clear, the poor toolmaker's drawings once more saw the light of day, and without the change of one line were used to make this machine, which was such a success that the chesty crew of lathe hands was cut to less than half.

The sequel to this true story is, that one of the toolmaker's friends who was also an employee at this factory, told him of the good use his invention was being put to, which prompted him to visit the president of the company and lay his case before him. This resulted in a most searching investigation, exposing the facts as related here, and the rewarding of the inventor with a very niggardly sum of money, and the inalienable right to pursue happiness and better compensation in any factory but the one he was forced out of.

Melting White Metals*

Refining by liquation is carried out in reverberatory liquation hearths also gas-heated, and the processes of melting and mixing of all usual alloys are performed in melting pots of a special design, a diagram and illustration in work of which are shown in Figs. 1 and 2.

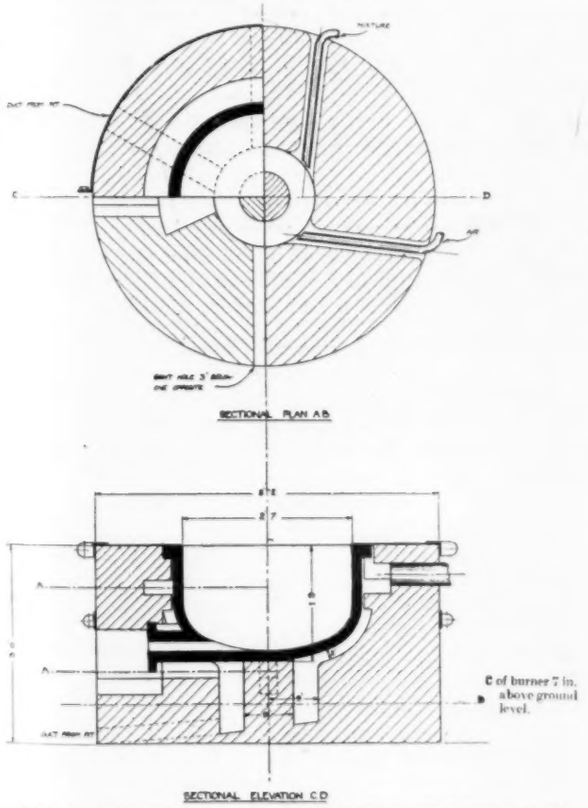


FIG. 1. DIAGRAM OF BOTTOM POUR MELTING POT

Town gas at ordinary pressure and air at a pressure of 4 in. mercury are employed; they are mixed before entering the combustion chamber, and the jet is introduced tangentially, so that the flame circulates round the pot, which is supported on a brick pillar, thus relieving the weight on the upper flange. A further supply of air is introduced somewhat in advance of the mixed jet. This insures complete combustion; after the furnace has been running for a short time a certain amount of preheating is effected, which makes for economy. The brickwork after a time retains sufficient heat to carry on for several hours after the gas is extinguished.

FIG. 2. BOTTOM POUR MELTING POT IN OPERATION

*From White Metals by Mundey, Bisset and Gartland. This paper was published serially in THE METAL INDUSTRY in January, February, March, April and June, 1923.

Copper and Milk

During the past few years, manufacturers of dairy machinery, producers of dairy products, and research laboratories have been disputing as to what metals milk could safely be handled in and through.

Quite lately, the Health Deparemtnt of the city of New York ruled in favor of tinned Copper.

Now the manufacturer, the Nestle's Food Company, tells the world that they, too, use Copper.

They came out flat-footedly and say, on every condensed milk can, "Copper vacuum pans make our product Clean, Wholesome, Pure and Rich."—BULLETIN OF THE COPPER BRASS RESEARCH ASSOCIATION.

Plating Non-Metals

The Deposition of Metals on Glass and Ceramics

Written for The Metal Industry by SAMUEL WEIN

The deposition of metals on glass and ceramics is both interesting and profitable. Such designs as monograms, flowers and geometrical figures can be placed on the surface with ease. These designs are permanent and cannot be readily effaced by ordinary handling. It finds application for water glasses, pitchers, and other home glassware and ceramics as well as in the electrical arts, as in the case of making what is termed "Leyden jars" or condensers.

The first question that the average plater will ask is "How is it possible to plate metals on a non-conducting surface?" The answer is that the surface is treated with a compound in which a metal or metallic salt is incorporated, and onto this the metal is electrolytically deposited.

GENERAL METHODS

There are three methods of depositing metals on non-conducting surfaces, these are:

1. An adhesive (gum, resin, or similar compound) is dissolved, into which is stirred such conducting elements as graphite or metallic powders, or both. This process is the cheapest. The results are quite permanent if done carefully, but with time the deposited metal has a tendency to peel. This process is used extensively in manufacturing the Leyden jars already referred to.

2. A metal or metallic salt is mixed with a flux, and this applied to the surface and then subjected to heat, the object being that the metallic salt is converted into the metal and at the same time fused into the surface proper. This process is by far the best and at the same time the most permanent. It is very difficult to remove, once the metal is fused into the surface.

3. The metallic salt is precipitated onto the surface by proper reagents, at the same time forming compounds with the surface to be deposited. This latter process is new and therefore necessitates a considerable experimentation on the part of the worker.

The first process is readily prepared by dissolving ordinary orange shellac in alcohol to the consistency of a thin paint. To this is added graphite (free from oil and grit) or bronze powder, or as already explained, both may be used to good advantage. This may be applied to the surface either by means of a hand brush or with an air brush. If the designs are not too fine in detail, paper stencils may be used to good advantage. This is placed away to dry (about one hour), proper electrical connections made thereto and it is ready to be copper plated. A copper cyanide solution is the best for the "strike" and after a while it may then be transferred to the ordinary copper sulphate solution.

One of the earliest processes used consisted of dissolving 1 gram phosphorus in 200 cc. carbon disulphide. The surface is painted with this and allowed to dry, preferably in the light, and then transferred to a solution of silver nitrate (½ ounce dissolved in 1 quart water). Rinse the article in water and it is ready to be plated from a silver cyanide solution.

The second attempt to deposit metals on glass made use of sulphur dissolved in oil spike of lavender till a solution of a common treacle is obtained. To this is added a solution of a metallic salt (silver or other metal) in ether. The compound formed is placed on the water bath and allowed to remain thereon until the mass assumes the thickness of a heavy paint. This is applied to the surface with a brush and subjected to heat of a kiln and after it is cool it is ready to be plated.

The second process outlined is quite simple and may be done by any plater familiar with handling chemicals. In this process nothing but the purest of compounds should be used throughout in order to get the best results. Furthermore, the compounds should be ground down to a fine powder; in fact, the finer the better, because the powder after it is fused on the surface shows as a coarse deposit.

METALLIZED SILVER

The first step in the process consists of making what is termed "metallized silver"; this may be done by adding 1 part nitric acid to 6 parts of water, to this is added about 1 ounce of metallic silver. When the silver is all dissolved it is diluted with several times its bulk of water. Then insert a piece of copper. After a time the silver will be found to be precipitated on the copper in the form of white flakes. The silver is then collected, dried and prepared for use. It is best powdered or ground in a mortar and pestle or, better still, in a paint mill.

The same thing can be accomplished by using silver chloride 1 ounce and sulphuric acid 1 ounce. To this is added a half ounce of scrap zinc. A violent reaction takes place. When this has ceased the solution is filtered and the filtrate is washed several times with filtered water. This product is ground down.

Pottier was the first to use metallic silver and a flux for this purpose. The formula he made use of consisted of:

Silver	75 parts
Lead borate	25 parts

These are ground together in the paint mill with a little essence of turpentine and oil of neats foot. This compound is applied to the surface and fired in the kiln.

Dimes recommends the following:—

Silver	1 ounce
Mercuric oxide	1 dwt.

The following recipes have all been tried and found to give good results, the fourth formula is that accredited to **LeForte:**

Formula 1

Silver chloride (fused)	1 ounce
Lead acetate	1 dwt.
Soda ash	1 dwt.
Potassium nitrate	¼ dwt.
Boracic acid	¼ dwt.
Borax	¼ dwt.

Formula 2

Silver chloride (fused)	1 ounce
Lead borate	2 dwt.
Potassium nitrate	2 dwt.
Borax	1 dwt.

Formula 3

Flint glass (powdered)	6 grams
Lead oxide	6 grams
Potassium nitrate	24 grams
Borax	6 grams
Boracic acid	12 grams
Silver chloride	1 ounce

Formula 4

Silver chloride	4 ounces
Boracic acid	4 dwt.
Potassium nitrate	4 dwt.
Flint (powdered)	4 dwt.
Glass (powdered)	4 dwt.
Soda ash	4 dwt.
Lead oxide	4 dwt.
Borax (calcined)	8 dwt.

METALLIZED GOLD

Gold may be used instead of silver for deposition; this may readily be done by dissolving it in aqua regia, which consists of 1 part nitric acid to 3 parts hydrochloric acid. Great care must be exercised in handling this solution, as the fumes arising are extremely poisonous. When the gold has completely dissolved, the solution assumes a beautiful greenish color, which is gold chloride in solution.

The metallized gold must be precipitated from this solution. To do this, divide the solution equally and pour into four tumblers. To each add twice its bulk of clear distilled water. Dissolve some ferrous sulphate in hot water and add it to the green solution until a precipitation takes place. The gold will be found on the bottom of the tumbler in the form of a brown powder, which, when it has been dried and has had the necessary amount of flux added, is ready for use. In pouring off the original solution there will be found a slight residue of an alloy which may be left in the tumbler. When the precipitate of gold has been completely extracted, the water may be poured off and the brown powder collected and dried. When dried it should be passed through a fine sieve or a piece of silk muslin.

Many workers have experienced great difficulty in securing an even deposit, this being due to the coarseness of the metal. **Hasburg** overcomes this coarseness by the following procedure. A gold chloride solution is prepared; to this is added an excess quantity of potassium hydroxide solution. A precipitate will form; on the addition of an excess of the alkali the precipitate will immediately redissolve. To this is added a solution of mercurous nitrate until no further precipitate forms. The precipitate is separated from the solution and washed and then treated with an excess of nitric acid (to dissolve the mercurous salts formed in the precipitate) and then thoroughly washed in running water. By this method the gold is left in an exceedingly fine amorphous condition; it is dried and ready for use.

The following recipe is used to a great advantage in Europe:

Silver chloride	1 ounce
Gold	5 dwts.
Bismuth nitrate	40 grains
Borax	18 grains
Glass (powdered)	1 dwt.

Several years ago Messrs. Heller and Baumgartl produced a compound and called by them "Tombac"; it is made of:

Copper	3 parts
Zinc	1 part
Gold	⅛ part

Of this tombac use is made as follows:

Enamel	2 parts
Borax (calcined)	1 part
Tombac	1 part

Another gold compound is made of:

Bismuth nitrate	12 parts
Borax	1 part

Of this take:

Flux (as above)	1 part
Gold	12 parts

PLATINIZING

Pour some oil of rosemary over platinum chloride in a small porcelain mortar and knead it with a pestle, renewing the oil about three times. Continue this operation until there is produced from the brownish red chloride a black plastic mass, wherein no particles of undecomposed platinum chloride can be found. Pour off the excess oil of rosemary, rub it up well with the pestle and about 5 times its weight of oil of lavender, until it has become a perfectly homogeneous thin fluid. Allow it to stand for a half hour, apply this to the surface in a thin layer. Place this in the kiln or over a Bunsen burner at a low heat and for a few minutes, at a red heat. Prepare enough for use at a time as it does not keep.

The last of the processes suggested is that accredited to **Marino**. This is usually done by applying two or more layers of sodium silicate (water glass). This is best done by dissolving 1 part sodium silicate (sp. gr. 1.27) in 2 parts water. This is applied as the first coat and the second coat consists of equal parts of sodium silicate and water. The surface is then brushed over with a solution of silver chloride 100 parts dissolved in 140 parts of a saturated solution of potassium cyanide to which is added 60 parts ammonium fluoride. The silver chloride film is reduced to metallic silver by applying a solution of 100 parts hydrazine sulphate dissolved to a saturation. To this is added 60 parts sodium hydroxide or carbonate.

The method of procedure is to apply the silver solution, then the reducing solution and finally submit to friction caused by a rapidly rotating brush. The article thus treated is then ready to be deposited with copper or other metals in the usual manner.

Large Bells Cast

One of the largest serviceable bells in the world has just been cast at Apolda, near Weimar, to replace that taken from the great Cologne Cathedral during the war. The latter, known as the "Kaiser Bell," was made out of French guns captured in the Franco-Prussian war, but was melted down during the world conflict for conversion into materials to use against the French. The "Kaiser Bell" was cast in 1847 and weighed nearly 30 tons.

The new occupant of the Cathedral's dome has been formally baptized "St. Peter," but already is popularly referred to as "The German Bell on the Rhine." It weighs more than 27 tons, and is nearly eleven feet in height, with about the same diameter. Its upper half is decorated with antique and religious figures, below which are numerous inscriptions.

To insure the clarity of the bell's voice, Master Heinrich Ulrich, its maker, had it subjected to a temperature of 1,400 degrees Centigrade, or 200 degrees above the usual maximum. The composition is 78 parts copper and 22 parts tin.

The largest bell ever cast is the great bell at Moscow, "Tsar Kolokol." It weighs about 180 tons, but never has been much more than a huge casting. The largest bell in actual use also is at Moscow. It weighs 128 tons. A bell in Upper Burmah weighs 80 tons, and the great bell of Peking weighs 53 tons. The "Jacqueline" of Paris, cast in 1400, weighs 15,000 pounds, and another bell of Paris, cast in 1472, weighs 25,000 pounds. The famous "Ambrose," at Rouen, cast in 1501, weighs 36,364 pounds, while the "Holy Ghost" bell of Strassburg weighs 8 tons. "Big Ben," of Westminster Clock Tower, in London, weighs 13½ tons.

In the Seventeenth Century in England skilled bell founders traveled from place to place with their foundry equipment and cast bells near to the places where they were to be used, a practice also followed in China.

Guaranteed Electro-Plating

A Plea for Better Electro-Plated Products in the Automotive and Other Industries That Should Carry the Guarantee of its Wearing Qualities by the Manufacturer*

By CHARLES H. PROCTOR, Plating-Chemical Editor, The Metal Industry

Men who live in Detroit and who have been in touch with the automobile plants know that hundreds of thousands of rims were not used when the slump came. They were supposed to be zinc-plated, but they soon become coated with rust, a good deal worse than if they had never been touched, but simply left there with grease upon the rims. So the automobile manufacturer began to realize that he had paid for something and had not received value in return. He said, "I bought those for zinc-plated rims, and we are to understand that zinc protects steel from corrosion. If it doesn't, what is the use of putting it on?" So these rims went back—and the manufacturer had to make good. The conditions had to be changed—and they drew up specifications. I know a little something about the specification. I know what they had to contend with.

Every man or woman who purchases an automobile or a plated automobile accessory can become a factor in the production of a better or longer-wearing electro-plated product. This applies not only to the automotive industry but to the plumbing goods industry, the hardware industry and many other industries that manufacture products that are under constant wear or exposed to atmospheric influence and consequent corrosion due to iron and steel's greatest destructive enemy—rust. The automotive engineers forced an issue upon the automobile rim manufacturers to produce a better electro-zinc plated steel rim when they formulated the specifications that the minimum amount of zinc deposited upon an automobile rim should be ⅛ oz. per square foot of surface except under the clincher where it should be not less than 1/10 oz. Heretofore it has been difficult to throw a greater amount than 1/10 oz. per square foot of surface as compared with ⅛ oz. upon the outer surfaces of the rim, but it can now be done.

These prescribed conditions can now be materially changed with the advent of improved zinc cyanide solutions that are capable of the depositing of zinc over the auto rim uniformly, both outside and inner surfaces. At an extra cost to the consumer of a maximum of ten cents per rim, the automobile rim manufacturers could afford to deposit not less than one-third ounce zinc per square foot of surface, which would give three times the rust resisting material than when one-eighth or one-tenth ounce of zinc is deposited.

The rim manufacturer might state that the consumer will not pay the extra cost. Everyone knows that the consumer always pays the price in the end of a poorly plated as well as a poorly manufactured product of any description. Train the public to appreciate better products that give better protection to the product and a longer life, and they will willingly pay the price, because **when you save the surface you save all in a plated product.** Not only do these arguments for a better, more substantial plated surface apply to zinc but they also apply to nickel-plated products that are under constant wear, that must withstand friction from constant handling and must withstand atmospheric corrosion. Every automobile user, as he looks over his car within a few weeks (or in rare instances a few months), is filled with disgust when he finds that his beautifully nickel plated surface is is only a sham, like human beauty, only skin deep. The nickel peels or the steel surface beneath the nickel rusts and the beautiful surface of the new car is only a sham.

An additional five or ten dollars added to the cost of any automobile will give a plated product that can be guaranteed even as the name "Rogers 1847" is a standard, world-wide guarantee that the consumer is getting what he pays for. Let us have more "Rogers 1847" guarantees in the electro plating industry.

It is my desire that this 1923 Convention of the American Electro-Platers Society go on record in support of better plated products which will be more enduring under the rigid service that all plated products must endure under our modern conditions, and that the application of electro-plated surfaces shall be improved so that the maximum of wear can be assured to the consumer who must pay the price of poorly plated defective products. The Bureau of Sandards, Washington, D. C., and the Society for Testing Materials can join in this important step.

The electro-plating field is an extensive one. It requires a greater study of plating problems under theoretical and then practical working conditions, which, after all, are the final test. As an incentive to greater efforts in the field of electro-plating or electro deposition of metals, I would suggest to the Supreme Society that a gold medal be awarded at each convention to the author of a paper or papers covering the advancement in the electro deposition of metals for that year, the medal to be awarded to the author of the paper which is judged to be of the greatest value to the commercial electro-plating industry. All papers to be considered should be published originally in the American Electro-Platers Society Monthly Bulletin during the twelve months ending not later than May 31st so that a special committee to be named by the Supreme President can decide by majority vote the person entitled to receive the gold medal so awarded. The competition should be open to all. As the first step in connection with the proposed presentation of the gold medal, I shall be pleased to offer my check for twenty-five dollars to defray part of the cost of such a medal, if acceptable to the Supreme Society, for the first presentation.

The motto of our Society is Knowledge and Power, and each year in our history should increase our knowledge. Patrick Henry said "I have but one lamp by which my feet are guided and that is the lamp of experience." You and I know that in our industry it is experience that after all is the best teacher.

*From an address at the Convention of the American Electro-Platers' Society in Providence, R. I., July 2-5, 1923.

Metals in the Leviathan

The steamship Leviathan is a veritable copper mine. There are the finest brass screws and the 16½ foot bronze propellers. The heating coils for the staterooms contain 25 miles of copper tubing weighing 250,000 pounds. The lighting system has nearly 150 miles of copper wiring. The condensing system has more than 20,000 pounds of admiralty brass tubing.

THE METAL INDUSTRY

With Which Are Incorporated

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EDITORIAL

THE GREAT METAL WORKS

In our issue for August, 1922, was published, under the title "A Century of Brass Making," the history of the American Brass Company. In March, 1923, a similar description of the Chase Metal Works appeared. In this issue The Metal Industry, on page 309, will be found the story of the Scovill Manufacturing Company, completing the series and covering, within a year the three great brass manufacturing companies of the United States. In this way we have also covered the history of the brass industry in this country from its infancy, for it was in the Naugatuck Valley of Connecticut that brass making began and grew to its largest proportions.

In recent years, other mills have sprung up with greater or less success, and although many have predicted the eventual decline of Waterbury as a brass center (especially since the purchase of the American Brass Company by the Anaconda Copper Mining Company), it is still the leader by a wide margin. Rome has been a sturdy competitor, however, and since the phenomenal growth of the automobile industry, Detroit has come forward more prominently than ever with its two large mills.

There are few industries which can point to concerns in it, a hundred years old. The brass industry has the three great Waterbury companies to its credit with such records. It is indicative of the character of the men who have grown up in and with the brass industry for three or four generations that these organizations have maintained their record of steady growth, through good times and bad, and from one management to another with hardly a set-back.

BETTER ZINC COATINGS

It is reported by the Bulletin of the American Zinc Institute that the subject of zinc-coated iron and steel has been taken up by the National Association of Sheet and Tin Plate Manufacturers and the American Zinc Institute. Among the details discussed were:

(1) Determination of proper gage and proper coating, through laboratory tests.
(2) Trade-marking material made under jointly satisfactory specifications.
(3) Licensing of the use of such trade-mark.
(4) Laboratory tests of such trade-marked material from time to time.
(5) Withdrawal of the right to use such trade-mark whenever necessary to maintain the standard..
(6) An advertising campaign sufficiently broad to acquaint prospective users with the fact that a Zinc coated, or non-corrosive, material was available the efficiency of which could be absolutely depended upon.

It seems that zinc-coated products have been made and sold without regard to the amount of zinc used, or the climatic conditions to which they were to be subjected. This has resulted in failures, due to the poor quality of the coating work, rather than the material used. In addition, price-cutting competition has, in many cases, forced down the quality of the product. As a consequence, consumers have turned to substitutes.

It was suggested that zinc-coated products be properly advertised and trade-marked and placed under licensed control. The plan was to enlarge the market for such products by "adopting and maintaining revised standards and advertising their superiority."

It is a thoroughly sound plan. It is high time that the trade adopted standards for the quality of the coating laid and then, by means of a trade-mark, guaranteed such a coating. It is a pity that such a good protective agent as zinc should be given a black eye by inferior handling.

BUSINESS AND THE LABOR SHORTAGE

An interesting point of view about the labor shortage is expressed by Charles Piez, formerly of the Emergency Fleet Corporation and now president of the Link-Belt Company, in Management Engineering in an article "Is Labor Shortage an Unmixed Evil?" Mr. Piez, in going over business rises and falls, says that he can understand the cessation of buying in 1921, but has no valid explanation for the concentrated demand during the past few months, which pushed prices and wages almost up to the disastrous levels of 1920. The producing capacity of the country was ample to have taken care of all demands during the past four years without overtime, if the orders had come steadily. But the orders did not come steadily. There were recurrent rises and falls, rush and slack periods, prices too high and then too low with consequent shortages and surpluses of labor.

The demand of certain manufacturers for unrestricted immigration to overcome the present shortage is deplored. It is stated that such a "remedy" would not effect a cure, but simply aggravate the evil. The next little dip in the business curve would result in widespread unemployment.

The solution put forth is the stabilization of business

> "so that a fairly uniform demand can be met by regular employment of both the workers and the facilities in industry. . . . There would be no labor shortage, no towering prices, no serious and continued unemployment, if some of the demand at the peak were postponed to swell the volume during the recession that is bound to follow. . . . We can't do all the busines of three years in a single year and demand postponed doesn't mean that it will never reappear. We need business for 1924 and 1925."

All of this seems to us good, sound sense. It occurs with Secretary Hoover's recommendation, a few months ago, that the Government should postpone its building program until such a time as it would be a needed help, rather than a competitor in the material and labor market. Although individual businesses cannot always postpone their purchases, nevertheless some of the larger, more closely knit industries, like railroads and public utilities might well bend their energies in that direction.

AMERICAN FUEL RESOURCES

An instructive graphic representation in a recent issue of the Scientific American shows the production, consumption and quantities remaining of various fuels produced in the United States. These fuels are, of course, coal, oil and natural gas.

The total quantity of coal produced per year is fixed at 650,000,000 tons. Its uses are as follows in order of their importance: (1) steam; (2) household purposes; (3) for beehive coke ovens; (4) by-product coke ovens; (5) miscellaneous. The oil production at the present time amounts to 443,400,000 barrels, the larger part of which is used as fuel oil after the elimination of other important commodities, such as gasoline and kerosene. Gas is also an important by-product, as are lubricants.

Natural gas is consumed at the rate of 7,600 cubic feet per capita or about 760,000,000,000 cubic feet per year.

Of particular interest are the figures relating to the fuels still untouched, which form our insurance against scarcity in the future. Of anthracite coal there seems to be remaining 17,000,000,000 tons, approximately five times as much as we have already taken out. Of bituminous coal there are 1,510,000,000,000 tons, and so far as we can see, these will last fully as long as there will be any need for them since the total of bituminous coal removed so far forms only about 1½ or 2 per cent of what is still in the ground. The petroleum remaining has been estimated at 5,814,000,000 barrels, very little more than the quantity already taken out of the wells. This seems to indicate a very short life for our petroleum industry and consequent difficulties for those industries which use it or its by-products. Whether new wells will be discovered or whether the country will be forced to fall back on the oil shale deposits, which are practically untouched and which form a reserve of billions of barrels, is hard to say. There is a fair amount of interest being evidenced in the oil shale industry today, but it is necessarily handicapped by its inability to compete with well oil at the price.

INDUSTRIAL CO-OPERATION

A statement issued by the Division of Industrial Co-operation of the American Mining Congress indicates the trend of thought among intelligent employers of labor. Years of bickering and ill-will have shown that strikes and lock-outs are no solution for our difficulties; that the result of fights is defeat for the loser and losses for the winner—making them both losers. The following platform of the Mining Congress might well serve as a guide to employers in other industries.

"Industrial co-operation between employer and employee is good business.

"Equitable compensation and good working conditions are essentially fundamental.

"Industrial peace will be brought about only through confidence in management, and that that confidence can be secured only through a closer personal touch between management and employees.

"Satisfied employees are the best investment any company can make, and mean millions of dollars to the mining industry.

"Future peace of industry will not be found in 'organized employers' and 'organized employees' that are created to fight each other. This has been tried for half a century and failed.

"There is a common ground upon which every employer and employee can meet, and that this common ground is born of confidence, and sustained through a recognition of interdependence.

"The mining industry needs the regenerating influence of reciprocal relations between employer and employee. There is no other road to permanent industrial peace."

New Books

Metals and Metallic Compounds by Ulick R. Evans. Published by Longmans, Green & Company in four volumes. Size 6 x 9. Volume 1, 396 pages. Volume 2, 468 pages. Price, payable in advance, volume 1, $7.00, volume 2, $6.00. For sale by THE METAL INDUSTRY.

This is a comprehensive work embracing the entire subject of all the metals and their compounds. The author, who is at King's College, Cambridge University, states that the work is "an attempt to correlate cause and effect and to introduce such theoretical views as will serve to connect the known facts in an ordered sequence." While the work is primarily intended for the advanced student of inorganic and metallurgical chemistry, it will be extremely useful also for the industrial chemist and for the engineer.

Volume 1 contains an introduction covering the fundamentals of physics and chemistry as applied to metals. In this introduction are included electricity, chemistry (both analytical and thermo) and in addition several chapters on the more theoretical aspects of matter and its methods of formation into various combinations of elements.

Another part of the book is devoted to metallography. It is a survey of the subject rather than a detailed handbook, since it would, of course, be impossible to go into great detail in the short space of 95 pages. However, the work is sound and clearly written, giving the reader an excellent grasp of the subject. Another part is devoted to electrochemistry, to which considerably more space is given. Covering as it does the subject of electro-deposition, corrosion and the colloidal state in metals, this part will interest the metallurgist no less than others.

Volume 2 covers the metals of the so-called "A" groups. These metals are discussed as to their occurrence in nature, their recovery, their technology and uses. A list of the metals included is as follows: Lithium, sodium, potassium, rubidium, caesium, ammonium, berylliu, magnesium, calcium, strontium, barium, radium, boron, aluminum, rare earth metals, actinium, titanium, zirconium, cerium, thorium, vanadium, niobium tantalum, chromium, molybdenum, tungsten, uranium, manganese.

A Symbol of Safety by H. C. Brearley. Published by Doubleday, Page & Company, Garden City, N. Y. Size 6 x 9, 290 pages. Price, payable in advance, $2.50. For sale by THE METAL INDUSTRY.

The book is labeled "an interpretative study of a notable institution organized for service—not profit." The volume is a popular exposition of many phases of the relationship between the Underwriters' Laboratories of Chicago and the Manufacturers of Fire Protection and Other Safety Appliances. Other departments of the laboratories' work are included. There are discussed all types of fire prevention methods and devices for controlling hazards which occur with the use of electricity, chemicals, etc.

There are many illustrations and the story of the Underwriters' Laboratories is told in such an interesting manner that the book makes, not only valuable, but enjoyable reading for anybody connected with an industrial plant.

The Metalltechnischer Kalender for 1923, edited by Prof. Dr. W. Guertler. Published by Gebrüder Borntraeger of Berlin. 216 pages. Price, payable in advance, $1.50. For sale by THE METAL INDUSTRY.

This year it contains a much fuller account of the constitution of the binary alloys. In almost every chapter additional data are given that make the publication of greater value than last year's Kalender, good as that one was. As in last year's issue we find another little gem which shows how valuable the study of the phase diagrams may be to those who will take the trouble to study and master them. This may be briefly stated as follows:

In technical operations the casting of metals and alloys is of great importance in foundry practice. Good pouring is conducive to the development of many desirable properties. First of all it is so much easier to pour or cast a metal the lower its melting point is, for so much less heat is used to melt it. The melting point itself, we borrow from the phase diagram, which, for the technically important alloys, for the most part has been established. Examples of which, in this little book, are furnished by some thirty-seven diagrams.

Furthermore we are in need of guarding against the least risk of liquation, shrinkage and piping. These phenomena are all dependent upon the certain separation of the crystalline and fluid constituents from one another during the semi-fluid transition from the fluid to the completely crystalline state. These conditions, so important to know, are the more menacing the greater the melting interval is between any two metals under consideration.

For the particular composition of the technically important alloys we also borrow this data from the phase diagrams. In addition these phenomena depend within very narrow limits upon the volume alterations during the freezing.

Moreover the degree of the fluidity, the so-called fluidity, or its opposite, the viscosity of the metal comes into consideration. That is to say, practically, the thinner the fluid of the melt is the sharper the molds will fill.

Finally we require, as said before, a casting of the utmost density. Unsoundness or porosity arises in a casting by the occlusion of gases which escape during the process of freezing, but in trying to escape through the already frozen outer skin are prevented and for that reason are enclosed by the freezing mass of the metal and thus form blisters which appear to us in the phenomena of pores.

Now, in a very simple manner the evolution of gas during the freezing depends upon the solubility of the gas referred to in the molten metal on the one hand and in the metallic crystals that are forming on the other hand.

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2. Joints should therefore never be made by soldering unless they are to be protected against corrosion by a paint or varnish, or unless they are quite heavy, such as repairs in castings, where corrosion and disintegration of the joint near the exposed surface would be of little consequence.

3. Solders are best applied without a flux or by using paraffin as a flux, after preliminary cleaning and tinning of the surfaces to be soldered. The composition of the solder may be varied within wide limits. It should consist of a tin base with addition of zinc, or of both zinc and aluminum, the chief function of which is to produce a semi-fluid mixture within the range of soldering temperatures.

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Tin-zinc solders:

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The uniform red color is obtained after casting, by first, water rumble the casting and then dip in acid. First dip in nitric acid then dip in cold running water, then dip in sulphuric acid, then dip in cold water, then dip in hot water and place in sawdust to dry. In a short time the casting will tarnish like sample.

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Hot water	3 quarts
Muriatic acid	1 "
Verdigris powder	3 pounds

Copper carbonate	8 ounces
White powdered arsenic	8 "
Sal ammoniac	3 pounds

The mixture will be of the consistency of paint. Apply cold and as little as possible to the surface of the copper. Do not wash the surface after applying. A green coating will result that will become more antique with exposure to the weather.—C. H. P. Problem 3,227.

OXIDIZING GOLD

Q.—Kindly publish a formula for a high class oxidizing fluid for 10 and 14 karat green, red and yellow gold. The oxidize to show up very black, with a grayish tint, when brushed.

A.—The only oxidizing solution that will give a satisfactory black finish upon 10 and 14 karat green, red and yellow gold is the platnimum iron chloride solution. The solution may be prepared as follows:

Platinum chloride	¼ ounce
Iron perchloride	⅛ ounce
Water	1 pint
Grain alcohol	8 ounces

Dissolve the platinum and iron chlorides in the water, which should be warm. Then add the alcohol and mix thoroughly.

When applying the oxidize, heat the articles lightly in a bunsen flame first to about 212 degrees Fahr., and apply the oxidize with a soft brush. Relieve as desired with finely powdered pumice stone and bicarbonate of soda.—C. H. P. Problem 3,228

PROTECTIVE LACQUER

Q.—Our problem is that we have a part which is etched the same as a name plate and then has to be formed through dies and then oxidized. The finish of the oxidize must be a bright solid black. The metal is thoroughly broken down at the start and all through the etching processes is carefully handled so that the dials when they come to the presses are in perfect condition so far as the metal is concerned.

In order to avoid tarnishing and the marks of handling we lacquer these plates with a thin coating of lacquer. Our difficulty lies in our ability to thoroughly remove this lacquer quickly. We can, of course, get the lacquer off if the dials are handled singly and get perfect results from the oxidizing solution, but if we try to run these through in any quantity the lacquer seems to hang, causing variations in the color of the dial after it has passed through the oxidizing solution.

A.—We should infer that all that you require to protect the dials during the press operations to prevent finger marks and oxidation is a very thin, fluid, easily removable lacquer. Such a lacquer can be prepared from white or brown French copal varnish, which may be thinned down so that it will be very readily soluble in wood alcohol, which is the cheapest rapid solvent.

The thinner should be composed of equal parts of amyl acetate and fusel oil. Then take

French varnish	1 part
Thinner, as outlined	3 to 4 parts

Dry as usual.

To remove the lacquer immerse in wood alcohol for a few moments. If the alcohol can be slightly heated the lacquer will dissolve instantly. Afterwards immerse the dials in hot water, then in a dilute cyanide dip to remove any stain; rewash in cold water and oxide as usual.—C. H. P. Problem 3,229

REMOVING ENAMEL

Q.—Will you please tell us what to use to remove hard enamel from radiator shells? We find caustic soda unsatisfactory and slow.

A.—The quickest and most efficient method to remove hard black enamel from radiator shells is by the electric current in connection with a caustic soda and soda ash solution. If you have an iron tank at your disposal, that you can heat, so that a solution can be maintained at 180 degrees Fahr., connect it directly with the positive current so that the tank becomes the anode.

Connect a good heavy copper rod across the tank as the negative, as you would for regular plating, and connect the radiators by heavy copper wire or hooks to the rod. Use as much current as you have at your disposal, and if the following basic formula is used, the enamel will be removed in a few minutes:

Water	1 gallon
Caustic soda	6 ounces
Soda ash	2 ounces
Sodium cyanide	½ ounce

Still cleaning requires too long a time to soften the enamel. The electric method is quicker and more efficient.—C. H. P. Problem 3,230.

SAND ANTIQUE FINISH

Q.—I am mailing you under separate cover a brass-plated steel door plate. I am going to ask you to give me some instructions and a formula to make this color on brass-plated steel parts. I have tried the golden sulphate of antimony and caustic soda dips; also sulphurette of potassium and caustic soda dip, but got no results.

A.—The finish of the sample you have submitted is termed "Sand Antique Finish." The method of producing this finish is as follows:

The steel parts should be heavily brass plated; then scratch-brushed. It will be necessary to sand blast the surface of the steel before brass-plating to get an exact duplicate of the finish.

After sand blasting, brass-plating, and brushing immerse the articles in the following solution:

Water	1 gallon
Hyposulphite of soda	8 ounces
Lead acetate	4 "
Temperature 180° Fahr.	

As soon as the articles turn a gray black remove, wash and dry them. The brush down with a tampico brush and pumice stone, wash and dry, and then lacquer.

The regular ammonia-carbonate-of-copper dip may also be used to get the black finish. All other manipulations are the same.

AMMONIA BLACK SOLUTION

Water ammonia	1 quart
Carbonate copper	16 ounces
Carbonate of soda	8 "

Dissolve the materials in the order given; that is, the carbonate of copper in the ammonia. The carbonate of soda should be dissolved in 1½ gallons of warm water and added to the carbonate of copper and ammonia solution, and mixed thoroughly. Heat the solution to 120° Fahr.—C. H. P. Problem 3,231.

STICK BRASS AND BUSHINGS

Q.—As we contemplate making stick brass and bushings, we should appreciate it if you would kindly give us some information as to the best method of making the patterns, such as used by the large manufacturers; as well as the best method of molding and casting. Kindly also advise us if a molding machine is used, and if so, what make?

A.—The method of making the patterns will depend upon the volume of business you can obtain in this line of work. Most foundries make single split patterns up to 4 inches. If large enough orders are obtained the wood pattern may be mounted on a plate for a molding machine.

The style molding machines used in large foundries is of the power type. For small bushings, power molding machines are used in practically all cases.—W. J. R. Problem 3,232.

TINNING CAST IRON

Q.—We have a considerable number of cast iron shells to line with babbitt metal. The specifications call for tinning these shells thoroughly before pouring the babbitt. We have never been able successfully to tin cast iron, and would like to have you write us any information that you have regarding the subject.

A.—The inside surfaces of these cast iron shells must be perfectly clean and should be free from all sand. The best method to use is the sand blast process. The flux generally used for tinning cast iron is zinc chloride. The flux is added first and the solder melted by heating the shells over a pressure flame and then tinning with solder before babbitting.—P. W. B. Problem 3,233.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,454,351. May 8, 1923. **Method of and Flux for Refining Brass.** Henry Thomas, Cleveland, Ohio.

In a method of refining brass scrap, the steps which consist in fusing such scrap with a flux consisting of two parts of glass, one part of borax and one part of fluorspar.

1,454,387. May 8, 1923. **Process of Alloy Knife Hardening or Tempering.** Thomas B. Lashar, Bridgeport, Conn., assignor to Associated Silver Company, Chicago, Ill.

That process of shaping and hardening nickel silver alloy knife blades which consists in subjecting the alloy while at a natural temperature to a striking blow and confining the alloy in a cavity of a cross section substantially that desired for the finished blade.

1,455,307. May 15, 1923. **Process of Uniting Metals.** Harold A. Soulis and Wilbur T. Soulis, New York, N. Y. The process of uniting structural parts of unlike metals having relatively different melting points, consisting in relatively locating the parts and then immersing them in a metallic bath having a substantially constant temperature maintained slightly below the lowest melting point of the metals.

1,455,531. May 15, 1923. **Alloy.** Arthur S. Hyman, Newark, N. J. An alloy containing substantially 58⅓% silver, 16⅔% copper, 16⅔% zinc and 8⅓% nickel.

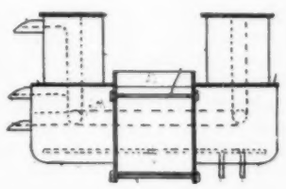
1,455,589. May 15, 1923. **Alloy.** Henry C. Kirk, Roland Park, and George H. Dumler, Baltimore, Md.

A copper alloy substantially in the proportions of 10% iron, 1% nickel, the balance being copper.

1,455,747. May 15, 1923. **Electric Process of Continuously Heating Metal.** Albert E. Greene, Seattle, Wash., and William B. Runyan, Dayton, Ohio.

The process of treating metal in an electric furnace which consists in forming a secondary circuit of molten metal around a magnetic core, inducing current in said secondary circuit by means of said core, and causing the metal to flow continuously into said circuit and out at a different point heating the metal meantime.

1,455,748. May 15, 1923. **Electric Induction Furnace.** Albert E. Greene, Seattle, Wash.



An electric induction furnace comprising a primary winding, an endless channel in refractory material to contain molten metal and form the secondary circuit of the induction furnace, an auxiliary channel leading down into said first named channel for pouring molten metal into said endless channel, and another auxiliary channel in refractory material leading upwardly from said endless channel at another point thereof for the exit of metal.

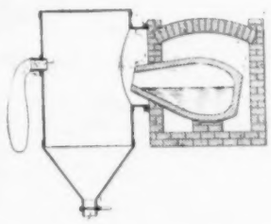
1,456,128. May 22, 1923. **Manufacture of Extruded Metal Sections.** Marcel Adolphe Hardy, Hennebont, France.

A method of manufacturing extruded metal sections, comprising exerting pressure on a mass of metal to be worked, said pressure being applied on an area whose diameter is substantially less than that of a container in which the metal is placed; whereby a heat insulating layer of said metal is formed between the interior surface of the container and a means for exerting said pressure.

1,456,151. May 22, 1923. **Metal Polish.** William Albert Ruddell, Asbury Park, N. J.

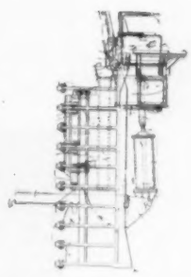
A metal polishing composition comprising a mixture of tripoli powder, oxalic acid, salt, borax, water and alcohol.

1,456,035. May 22, 1923. **Metal Dust and Process of Making the Same.** Minton H. Newell, San Francisco, Calif., assignor to the Alloys Company, San Francisco, Calif.



A process for manufacturing metal dust, comprising vaporizing the metal and condensing the vapor in the presence of a limited supply of oxygen.

1,456,231. May 22, 1923. **Casting Apparatus.** John H. Goss and Edward L. Wolff, Waterbury, Conn., assignors to Scovill Manufacturing Company, Waterbury, Conn.



In metal casting apparatus, and in combination a support, a bracket pivotally carried by said support and a plurality of co-operating mold sections pivotally secured to said bracket.

1,456,252. May 22, 1923. **Process of Coating Metals with Metal Phosphides.** Samuel Peacock, Wheeling, W. Va., assignor to Wheeling Steel & Iron Company, Wheeling, W. Va.

The process of coating metal shapes with protecting films which consists in making a mixture containing a phosphate compound and carbon mixed a viscous vehicle to form a paint; applying said paint to the metal surfaces to be protected; and heating said surfaces to a temperature sufficient to form a film containing a phosphide of the coated metal.

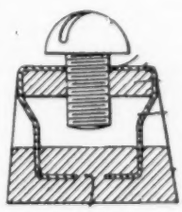
1,456,274. May 22, 1923. **Process of Rendering Metal Non-Oxidizable and the Metal.** Wm. J. Keep, Detroit, Mich.

The method of producing a non-porous highly-refractory surface on steel, iron and like ferric compounds to produce a product wherein such metal forms the core of the product, and wherein the surfact will resist heat temperatures in excess of those capable of reducing the metal forming the core.

1,456,486. May 22, 1923. **Compound for Cleaning Aluminum.** Catherine M. Hemen, Washington, D. C.

A cleaning composition formed of one pound white castile soap, one ounce oxalic acid, one ounce zinc oxide, one ounce bicarbonate of soda, one-fourth ounce gum tragacanth, six quarts of soft water, together with a sufficient quantity of a fine abrasive to hold the materials in a mixture.

1,456,868. May 29, 1923. **Process of Making Metal Castings.** Dominick Cordino, Plymouth, Mass.



The process of casting metals, consisting of incorporating into the mold a chaplet adapted to receive a screw threaded hole in the top, and having a core in the upper portion of the chaplet and a space below the core with an opening into said space, and then pouring the metal into the mold and filling said space and closing said opening with the molten metal and causing the chaplet to form an integral part of the casting.

1,456,869. May 29, 1923. **Metal Casting and Process of Making Metal Castings.** Dominick Cordino, Plymouth, Mass.

The process of casting metals consisting of forming a mold having a chaplet incorporated therein, said chaplet having openings on two sides, and having its upper portion filled with a core, and having a chamber located beneath the core.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Pulverizing Materials in the Metal Industry

Written for THE METAL INDUSTRY by Harlowe Hardinge, Vice-President, Hardinge, Co., Inc., New York

The art of pulverizing materials for industrial uses has advanced so rapidly within the last five years that it is well to outline in as brief a manner as possible, the methods now employed for several of the more important uses, particularly as they apply to the metal industry and foundrymen in particular. Take, for instance, the recovery of metals from foundry waste. The old methods employed were intermittent, required a considerable amount of labor and, to say the least, were highly inefficient. An extraction of 70 per cent of the total metallic content of the waste was considered good. Today, however, with the continuous process now in use in a number of plants, an extraction of 95 per cent is not at all uncommon and, in fact, should be expected from an operation which uses the most up-to-date equipment.

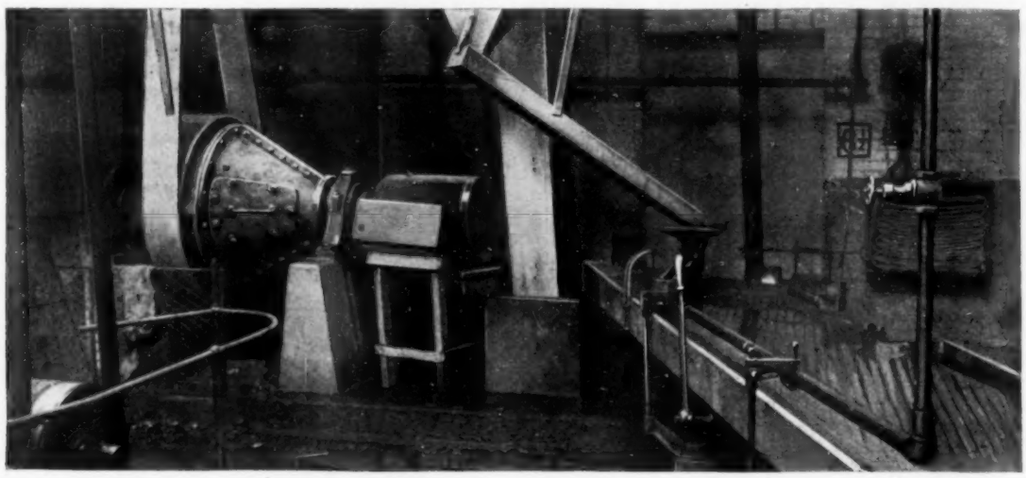


FIG. 1. SMALL RECLAMATION PLANT. CAPACITY 500 TO 1,500 POUNDS PER HOUR

Perhaps the most important single operation in the recovery of non-ferreous metals in particular, is the grinding mill. It is desired here to break the slag and waste from the metal, but do as little grinding of the metal as possible, for the extremely fine metal is not only likely to be lost, but is not easy to remelt and contains more than its share of slag and dirt. The conical mill, as now developed, is continuous in its operation and above all, delivers the product as soon as ground. The material on entering the mill is crushed by the large balls at or near the large diameter and, when partly broken, travels through the mill and is further reduced by the smaller balls, but since these smaller balls do not have the same force as the large, they do not have a tendency to overgrind, thus preventing the pulverization of the fine material. The product as it issues from the mill is passed over a screen; the coarse metal is separated therefrom and the fine is usually sent to a concentrating table. In larger operations, jigs are sometimes employed, which separate the coarser particles than the table could economically handle. Typical layouts are shown of small and large operation for the reclamation of this metal.

ECONOMICS OF METAL RECOVERY

It is impossible to state just what kind of a foundry should use metal reclamation equipment. This is a point which the foundryman himself must decide, although a few interesting figures are given below, and should enable him to figure for himself whether it would pay to have all of these sweepings and waste collected and sold to the local smelter or refiner two or three times a year, or reclaim them himself.

Analysis of a number of waste piles in various brass foundries showed that the waste averaged between 8 per cent and 15 per cent pure metal, thus a figure of 10 per cent might be considered fairly conservative. Now, if a particular brass foundry were operating on a basis so that the total waste accumulated per week amounted to 10 tons, then the total amount of metal lost, of at least tied up in the waste awaiting recovery, would be 2,000 lbs. Let us also assume that this particular class of metal costs, delivered at the plant, 15 cents per lb. and that the recovery possible by proper methods of extracting the metal from the waste would be 95 per cent, a figure which can readily be obtained in the modern reclamation plant. If this metal reclamation equipment were installed, it would cost to recover the 2,000 lbs. per week not more than $25, including power, labor, repairs and interest on the in-

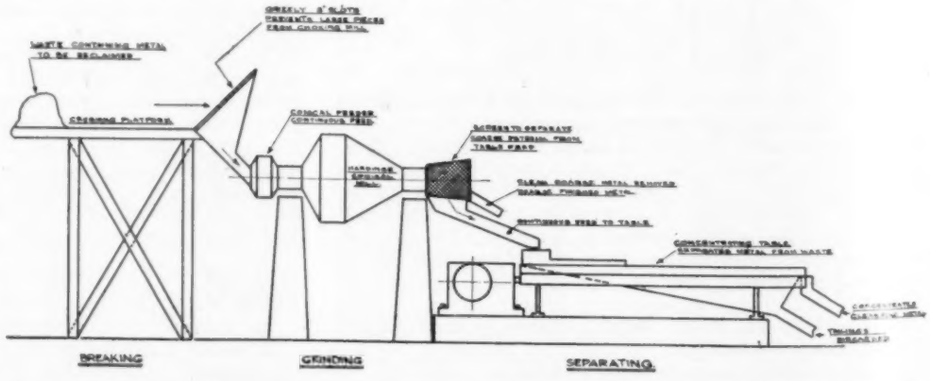


FIG. 2. LAYOUT FOR RECLAMATION PLANT. CAPACITY 500 TO 1,500 POUNDS PER HOUR

vestment. This unit would require very little attention as it is extremely simple in operation and needs to be run only two or possibly three days a week, the net saving per year would then be $13,520. This is quite an item, especially when a great deal of the waste remains idle and is not even sold to the refiners more than once or twice a year, and also in view of the fact that the reclamation equipment installed would cost only about $2,500 to $3,000.

RECOVERING ALUMINUM

The recovery of aluminum from slags is accomplished by either the wet or dry process. Both methods are very much the same, although difficulty is sometimes encountered in remelting the aluminum recovered from the wet process, due to the coating of oxide, which covers the wet ground aluminum particles almost immediately upon exposure to the air, while in the case of the dry ground particles, parts of the aluminum have been brightened up, which aids the melting. In this process, the entire product is passed over a 20-mesh screen and that which remains on the screen is ready for remelting; that which goes through is considered as waste. The economy of operation is not as great as with the heavier metal, as the fine particles of aluminum are lost when passing through the screen. However, when properly ground before going through the screen, a great many of the metal particles are formed into flakes. The grinding process, therefore, not only breaks away the slag from the metal, but it also prevents a large quantity of the finer metal particles from being lost by flattening them out and preventing their passing through the screen.

The grinding of zinc skimmings and other similar materials is accomplished in very much the same manner as that for recovering aluminum.

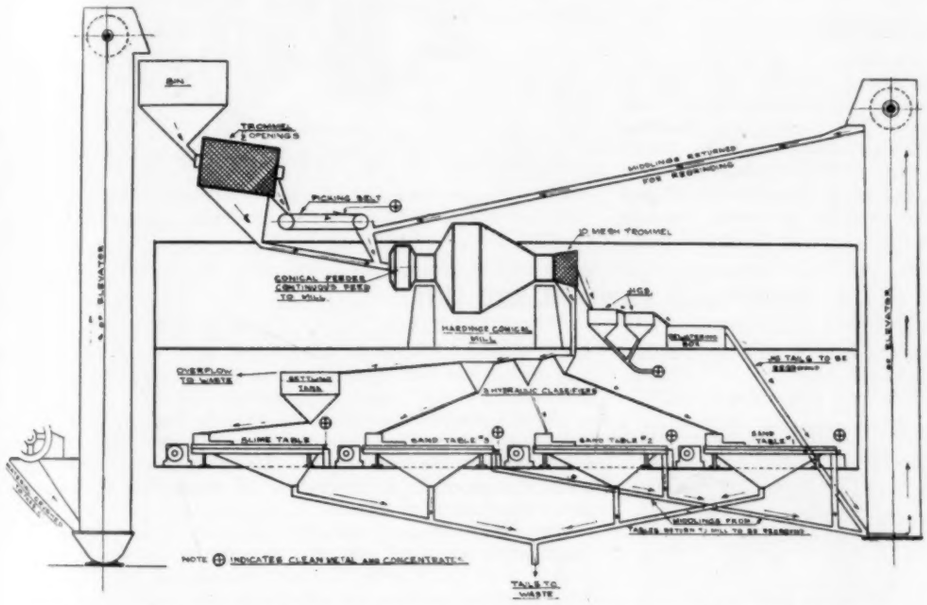


FIG. 3. LAYOUT FOR LARGE RECLAMATION PLANT. CAPACITY OVER 2 TONS PER HOUR

GRINDING ABRASIVE AND FACINGS

The foundryman is also directly or indirectly interested in other materials which require grinding, such as certain sands, sea coal, abrasive for grinding wheels and foundry facings, the latter being the most important and a subject with which he should become acquainted, so that he may be able to specify the kind of facings he wants.

The old methods of grinding foundry facings, which are usually made up of anthracite coal or graphite, pass the feed through Buhr stones or centrifugal pulverizers of some character. The product obtained by this method is not always satisfactory, unless proper separating devices are used. The present tendency, however, is towards continuous grinding in the ball mill, rather than attempting to make a finished product during the first passage through the mill. The material should be discharged before being fully ground, the oversize separated from the fine in a suitable air separator or other device. This oversize is then sent back to the mill for regrinding. This method enables the mill to produce much more for a given horsepower. The modern separators on the market have shown marked advancement in their capability of producing a fine uniform product. The two types which have shown the most improvement are, first, the one combining an air lift with the separation, using a large quantity of air throughout the system, and second, by a combined gravitation and centrifugal method in which the air is circulated within the separating chamber itself. The former method has the advantage of being able to lift the material from a lower to a higher level without the use of an elevator. It does require, however, two to three times the power of the latter. Extremely fine products can be obtained in either event and the uniformity regulated very closely, so there should be no further difficulty in securing a product suitable for the most critical foundryman. Typical layouts of both the air separating system and also systems employing vibrating screens are shown, and will give a good idea of how the equipment is arranged, the amount of head room and floor space required.

Abrasives, as now manufactured, are usually the product of an electric furnace operation. The material ranges anywhere from 4 in. down in size. These pieces must first be crushed and then ground. Until recently, one of the chief faults of abrasive manufacture was in the grinding, owing to the excessive wear which resulted upon the grinding devices, but recently, by the use of the conical ball mill, operating in conjunction with a vibrating screen, or air separator, the wear has been greatly reduced, to say nothing of saving at least 50 per cent in the power consumption. The abrasive is usually ground in two or three machines, and the product is run over screens of various meshes, so as to obtain close sizing. The various products are then formed in the wheels or other shapes required and cemented together with a suitable binder.

There are a number of other materials commonly used by the foundryman which are ground in one form or another, but the examples given above show the wide field of application and should assist in either selecting the process they would employ or at least enable them to know how the various materials they require should be ground to obtain a satisfactory product.

CHECKING METAL SCRAP

As a result of war conditions great stocks of scrap metal have accumulated which are of uncertain composition. Manganese bronze which may or may not contain a notable percentage of iron, mixed lots of steel bars, of which some are simple carbon steel, and some contain nickel or chromium, collections of aluminium bars or castings which may be any of three or four known alloys, are cases in point. The value of such accumulations is at once greatly increased if they can be sorted rapidly and with certainty; but the ordinary methods of chemical analysis are too lengthy and expensive to apply to each individual piece.

The spectroscope, it has been claimed, offers an ideal solution of a problem of this kind, with one important proviso: that the instrument must be selected and the technique defined by a spectroscopic expert. If this condition is fulfilled, it is possible for any intelligent young chemist or physicist not only to recognize the presence or absence of any metallic constituent, but to state roughly the percentage, as quickly as the pieces can be placed in position and removed by one or more laborers.

Messrs. Adam Hilger, Ltd., 75a Camden Road, London, N.W. 1, England, have demonstrated this method of sorting.

SAND BLAST MACHINES

AUTOMATIC SAND BLAST TABLE MACHINES

The table rotates 20-30 revolutions per hour so that the castings can be put on table and removed while machine is in operation. The sand blast will thoroughly clean upper side of castings during one revolution of table. Castings are then turned over by operator so that other side will be sand-blasted.

Sand-blast table machines are the best equipment for cleaning medium-sized castings that are too large for the sand-blast barrel machine, also castings that would be broken and scratched in the sand-blast barrel. The sand-blasting is entirely automatic, thus saving much time and labor. A double rubber curtain prevents sand and dust from spreading outside, but allows the castings to easily pass in and out of machine. The table is operated by means of a pinion and ring gear. This secures smooth running and prevents jumping of the table.

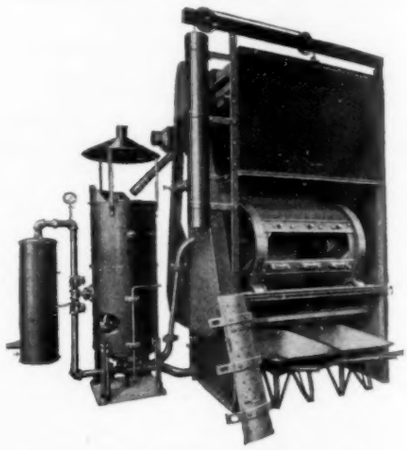
A two-compartment tank with two automatic filling valves makes continuous passing of sand through tank possible, thus securing continuous feed of sand. The machine can be operated all day without any interruption.

SAND BLAST BARREL MACHINE

Steel tires are shrunk on the heavy cast-iron heads. The charge can be dumped into an ordinary wheelbarrow or into boxes on trucks. If desired, dumping chute can be furnished so that the charge may be dumped on the floor. The nozzles point into the barrel through a small hole in the end walls so that the barrel is entirely free and unobstructed inside. The slanting end walls force the charge to roll sideways besides the turning over effected by the rotation of the barrel, thus securing quick and uniform cleaning. The barrel rotates three r. p. m., turning-over the parts. The cleaning is all done by sand-blasting, not by tumbling.

The sand-blast barrel machine is the best equipment for cleaning small and medium-sized castings, as the sand-blasting is done entirely automatically, thereby greatly reducing the time and the cost.

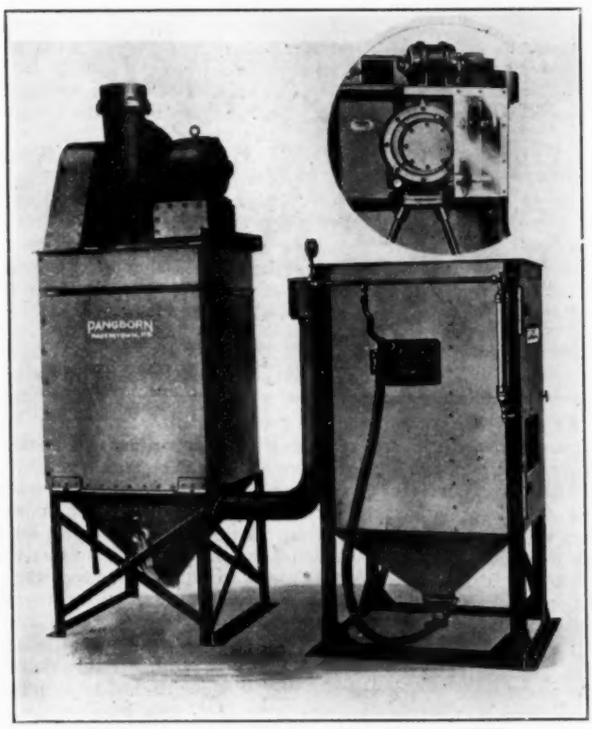
These machines are made by the J. W. Paxson Company, Philadelphia, Pa., to the designs of H. F. Hoevel. This company also manufactures a complete line of sand-blast equipment, especially in small sizes for brass founders.



PAXSON SAND BLAST BARREL MACHINE READY TO DUMP

COMPACT SAND-BLAST UNIT

A compact sand-blast unit complete with exhauster and dust arrested integral and direct connected motor drives, has been designed by the Pangborn Corporation, of Hagerstown, Md.



PANGBORN COMPACT SAND BLAST UNIT

Metal working plants having large or medium volume of work have long recognized the maximum economy of sand-blast barrel cleaning on account of the ability to dump a good sized charge into the barrel at a single load, without further attention till cleaned sufficiently, when the load is discharged by dumping. Used initially in foundries, the barrels were of a size to accommodate castings and were not available to plants having limited production or small pieces to handle.

The equipment shown is a barrel sand-blast, integral with exhauster and cloth screen dust arrester with direct connected motor drive for barrel and exhauster. The units are shipped fully assembled and ready for operation by connecting the ventilating pipe and compressed air.

The outfit is made in two sizes—the No. 1 Barrel, with a 20″ diam. drum 16″ long, and, with the arrester, occupies floor space of 3′ 3″ x 7′ 0″. The No. 2 Barrel has a drum, 30″ diam. and 20″ long requiring floor space of 3′ 7½″ x 7′ 5½″. The overall height of either is 8′ 10″. It handles grey iron, malleable steel, brass, castings, forgings and stamped pieces with equal facility.

NEW COPPER-BASE ALLOY

After investigations covering a long period of time the Dupont Engineering Company, Wilmington, Delaware, has developed a metal known as Everdur No. 50. They appointed the Supplee Biddle Hardware Company of Philadelphia, Pa., sole and exclusive distributers. The following description of the metal is given.

Everdur No. 50 has a copper base and is golden in color. It is considerably harder than copper and has a tensile strength two or three times as great. It can easily be cast, rolled, flanged, forged or spun, and can be drawn into the finest wire and tube. It is said to be entirely free from internal difference of electrical potential between ingredients which causes "dezincification" of brasses and disintegration in many types of bronzes. It has excellent non-corrosive qualities and can be remelted without changing its composition. A copy of the Biddle Metal Bulletin for July, 1923, describing Everdur No. 50 will be sent on request.

TARNISH PREVENTIVE

Permanite is a clear, water-white fluid, applied with a brush to polished metal surfaces which it is desired to keep bright. It is not a polish but is applied on top of the polished surface. The manufacturers claim that it preserves the surface for months.

Permanite is made by the Consolidated Chemical Works, 253 Broadway, New York.

NEW STOP-OFF VARNISH

A new stopping-off varnish for platinum electroplating, made specially for use with Baker platinum plating solution, has been marketed by Baker Company, Inc., Newark, N. J. Directions for application are as follows:

1. Before applying the varnish be sure that the object is thoroughly clean and free from grease.

2. Users are advised to practise on a sample piece of metal before undertaking important work—pour out into a suitable container a small amount of the varnish and apply on the parts which are not to be plated.

3. If a large surface is to be covered the entire article may be dipped into the varnish, provided any excess varnish is immediately shaken off; or the varnish may be applied with a flat brush, if done quickly, as the varnish cannot be brushed out like paint.

4. After the varnish has been applied it should be allowed to air-dry for at least five minutes.

5. Carefully inspect the article after the varnish has dried—if a sufficient quantity of the varnish has not adhered to all parts which are to be protected from plating, these places may be touched up with a small brush.

6. As the varnish is a non-conductor of electricity it is absolutely necessary that the platinum lead-in (cathode) wire makes direct contact with the object to be plated; therefore, if necessary remove a little of the varnish so that a direct contact can be made.

7. Bear in mind that both the varnish and remover are inflammable and subject to evaporation; it is therefore important that stoppers be replaced on both cans immediately after the required amounts have been poured out.

8. Do not return either the used varnish or the used remover to the original cans as contamination may spoil the remaining unused solutions.

9. The varnish is of the proper consistency for both brushing and dipping as originally supplied, but if it becomes too thick, due to evaporation, it can be quickly thinned by adding a small amount of the combined "Thinner and Remover."

10. Where the article has been dipped and it is desired to remove the varnish from those places which are to be plated we recommend the use of a small dowel stick flattened at one end and covered with a piece of muslin.

11. Dip the cloth-covered end of the dowel stick into the remover, blot off any excess liquid and rub the varnish from the desired parts; care must be used not to touch other varnished parts which are not to be plated.

12. At this point it is advisable to burnish the parts from which the varnish has been removed; this can be done by hand with a piece of hard felt.

13. A final inspection should now be made to determine if all parts not to be plated are covered by the varnish and if the varnish has been completely removed from those parts which are to be plated.

14. When the varnished article is ready to plate be sure that it is not allowed to touch either the sides or bottom of the plating vessel.

15. After plating, the article should be placed in a vessel containing just sufficient "remover" to cover it and after remaining a few minutes with occasional shaking, any particles of varnish adhering can be removed by brushing with a tooth brush.

NEW BLOW TORCH

A new blow torch, now being marketed by the Turner Brass Works, Sycamore, Illinois, U. S. A., claims a number of novel, useful and interesting patented features.

Its makers claim that it is the only blow torch with a safety valve. This valve, located at the end of the horizontal pump cylinder, is fitted with a diaphragm accurately proportioned to give away automatically at 40 lbs. air pressure. As torches operate at 18 to 20 lbs. pressure, this valve will not come into action until about double normal pressure is present. A thumb-nut on this valve permits the operator to release the air pressure, after his work is done, or to decrease pressure as desired during the operation of the torch.

Another exclusive feature claimed for this line of torches is the fact that there is but one opening in the tank. This opening is at the top, above the fuel line, and is sealed by the screw-thread filler-plug. By eliminating such soldered connections as burner inlet and upper and lower pump brackets, a frequent cause of leakage-trouble is removed.

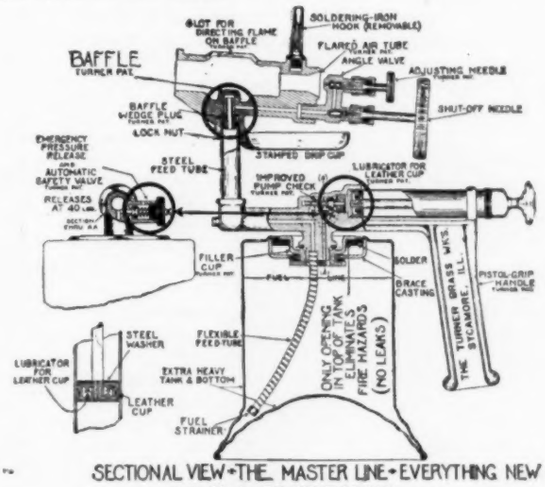
The sturdy, safe, smooth-functioning torch body just described is surmounted with a torch-head that may be said to play a "thinking" part in doing its daily work. The fuel, in its journey from the tank to the combustion chamber, passes through the interior of a solid bronze baffle, which its makers call the "Hot Spot Hump." This baffle is located near the outlet of the burner tube, in the path of the flame. It very soon becomes white hot, the intense heat vaporizing the fuel into a hot, dry, highly inflammable gas. This accounts for the makers' claim that these torches can burn kerosene or the leanest grade of gasolene, generating a heat some 400 degrees higher than ordinary torches secure from high-test gasoline.

Instead of depending upon a multitude of holes in the burner-tube for oxygenation of the fuel, the Turner "Master" torches admit the air through a flared inlet in front of the needle valve. This inlet is a bell-shaped nut, turned from brass screw-stock and threaded so that the operator with thumb and finger can screw it into or out of tube, thus regulating the distance from the needle-valve and consequently the volume of air admitted.

Air is also admitted through a long slot at the top of the burner tube, immediately above the Hot Spot Hump, previously referred to. This supplementary air inlet performs two functions; it deflects the flame downward upon the baffle or "Hump," and it provides additional oxygen to insure complete combustion at this point. The absence of holes in the sides of the burner tube is cited by the makers of this torch as one of the reasons why a Turner "Master" torch "can't blow out" in a gale of wind.

On blow torches, a very common source of trouble has always been the enlarging of the fuel orifice by "strong-arm" work at the hand-wheel. To checkmate that form of abuse, the Turner people have separated the shut-off valve from the fuel-control valve, placing the latter above the shut-off.

For the same reason they have given the needle valve only a small thumb-nut control so as to make it practically impossible for the operator to exert enough pressure to enlarge the orifice. The larger wheel has only one use—that of opening or closing the fuel-line. As its valve has a positive seat, there is never any occasion to use force on this wheel.



SECTIONAL VIEW • THE MASTER LINE • EVERYTHING NEW
TURNER BLOW-TORCH

A finishing touch to the "Master" torch is its wooden pistol-grip handle. This handle is hung at an angle that balances the torch perfectly, and at the same time gives ample room for the largest hand, so that the knuckles do not nearly touch the tank.

The use of a single length of curved steel tubing to carry the fuel from tank to torch not only gives a pleasing grace to the torch, but it eliminates all soldered or threaded joints

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

EXPOSITION OF CHEMICAL INDUSTRIES

Headquarters, Grand Central Palace, New York

All types of lacquers, for leather, for metals, for everything from pianos to shoe buttons, will be shown at the Chemical Exposition this year when it is held during the week of September 17 to 22 at the Grand Central Palace, New York. The Zeller Lacquer Manufacturing Company, the Egyptian Lacquer Company, and Maas & Waldstein, represent the chief exhibitors in this group. The substitution of certain lacquers for varnishes in special fields, the result of recent investigations, will be illustrated at the Exposition.

ENGINEERING STANDARDS COMMITTEE

Headquarters, 29 W. 39th Street, New York

The American Society for esting Materials has been designated by the American Engineering Standards Committee as sponsor for the following standardization projects:

Standard Specifications for Soft or Annealed Copper Wire.

Standard Specifications for Lake Copper Wire Bars, Cakes, Slabs, Billets, Ingots and Ingot Bars.

Standard Specifications for Electrolytic Copper Wire Bars, Cakes, Slabs, Billets Ingot and Ingot Bars.

Standard Methods of Battery Assay of Copper.

These specifications were approved some time ago as Tentative American Standards. The American Society for Testing Materials now contemplates the organization of a sectional committee to revise these specifications, when such revision is necessary.

AMERICAN ELECTROCHEMICAL SOCIETY

Headquarters, Columbia University, New York

The Electrothermic Division of the American Electrochemical Society, at the meeting in Dayton, Ohio, September 27, is to hold a group luncheon and round table discussion on Electric Furnace Brass Foundry Practice.

This round table will listen to no papers, but will engage in an informal discussion of live topics. The discussion will not be taken down by a stenographer, as the plan is to promote the utmost freedom of discussion. Not only the members of the Society but all interested in the subject from any angle are urged to come to join in the discussion, then make comments and ask questions.

Men will be present to swap experiences who have operated all kinds of electric brass furnaces under all kinds of conditions.

There is no stated program, but the subjects for discussion will be whatever the gang wants to talk about. The following subjects have been suggested:

1. Power rates in various localities—At what rates can an electric furnace show a saving?
2. Large furnaces vs. small furnaces.
3. Types of furnaces best suited for different jobs.
4. Operation of furnaces more than one shift per day.
5. Induction furnaces in jobbing foundry work.
6. Refractories.
7. Troubles—of any kind or description.

It is emphasized that the round table is open to every one interested.

Another subject to be covered is "Recent Developments in Electrolytic Refining of Metals." F. R. Pyne of the U. S. Metals Refining Company, Carteret, N. J., will act as chairman. This program will embody papers on copper, tin, lead, nickel, zinc, iron, etc.

As Dayton is one of the largest and important electroplating centers on account of the large amount of electroplating carried on by companies such as the National Cash Register Company and others, it is of interest to know that a Round Table discussion on electroplating will be held during the Dayton meeting. S. Skowronski, Chief Chemist of the Raritan Copper Works, is chairman of this division and will preside. Walter Fraime, Superintendent of the Electroplating Department of the National Cash Register Company, will take an active part in the discussion.

BRITISH METAL RESEARCH ASSOCIATION

Headquarters, 71 Temple Row, Birmingham, England.

The British Non-Ferrous Metals Research Association has undertaken an extensive series of investigations on die casting alloys which will spread over at least three years and entail an expenditure exceeding £10,000.

The Department of Scientific and Industrial Research, after holding conferences of those interested in die castings, has promised most substantial financial support to the research. The Research Association of the British Motor and Allied Industries, of the Scientific Instruments, and of the Electrical and Allied Industries, have also afforded their support, and are represented on the Committee controlling the investigations.

Various types of alloys are used in die casting, and recognizing the wide field, the proposed research has been divided into three sections: (1) Brass and bronze alloys; (2) Aluminum alloys; (3) Low melting point alloys (zinc, tin, lead, etc.). These three branches, with suitable arrangements for co-operation, will be dealt with in separate institutions, under the supervision of recognized leaders of metallurgical research.

Personals

G. B. Horsfull has joined the sales force of the New Jersey Zinc Company at New York, and will travel in the eastern territory.

R. P. Dryer will be the district manager in the Cleveland, Ohio, district for the Whiting Corporation. The office is located at 624 Penton Building, Cleveland.

C. F. Beatty has been appointed advertising manager of the New Jersey Zinc Company, New York City, in place of C. A. Stedman, who enters the Eastern Sales Department.

H. L. Erlicher, formerly Assistant to the General Purchasing Agent of the General Electric Company, has been named Assistant General Purchasing Agent, effective August 1, 1923.

H. J. Perkins has been appointed works manager of the Niagara Falls Smelting & Refining Corporation, Buffalo, N. Y. Mr. Perkins was formerly with the Sunnyside Bronze Foundry, the Delta Foundry Machine Company and F. Bangerter.

W. R. Hans will be the district manager for the Whiting Corporation, Harvey, Ill., at Birmingham, Ala. The territory includes Alabama, Georgia, Tennessee and northern Mississippi. The office is at 1702 Jefferson County Bank Building.

A. J. Peoples, secretary-treasurer Detroit Copper & Brass Rolling Mills, Detroit, was chosen second vice-president of the National Association of Credit Men at the recent annual convention held at Atlanta, Ga. Mr. Peoples has served four years as a director of the association.

H. T. Martin will conduct a consulting engineering service, covering production, designing, organizing in the metal and printing arts, at 32 Union Square, New York City. Mr. Martin has resigned as assistant to the president of the Lanston Monotype Machine Company, Philadelphia, Pa.

J. J. Siefen for the past two years superintendent of the Grand Rapids Brass Company, has organized the Bennett Brass Company and assumed the management of same at Greenville, Mich. The new company has been capitalized at $150,000 and the assets of the Regle Brass Company have been acquired from the receiver.

George G. Knecht, the well known representative of the Hanson & Van Winkle Company, has been assigned to the Connecticut territory, due to the retirement of the company's former Connecticut representative. The company hopes that

Mr. Knight will meet with the same courteous treatment extended its former representative.

Arthur F. **Braid** of the Metal & Thermit Corporation, New York, will go abroad to visit his home in Glasgow, Scotland. He left August 4th on the S. S. Adriatic and will return October 4th from Naples. Mr. Braid will attend the Foundry Convention in Paris, in addition to visiting England, Germany and Italy. He will be accompanied by Mrs. Braid.

W. T. **Randall,** Pangborn Corporation, Hagerstown, Md., has returned from England and Scotland, having been abroad nearly two months. Mr. Randall supervised the installation of sandblast equipment exported by his company, and also inspected other installations abroad. One of the installations he supervised was the erection of Harland & Wolff, Glasgow, Scotland.

B. F. **Pierson,** who has represented the Hanson & Van Winkle Company in the New England States for the past 27 years, has retired from business. Mr. Pierson has during this time, due to his personality coupled with his upright business methods, made numerous business as well as personal friends who will be sure to miss him. The company with which he was connected for so many years sincerely regrets the retirement of such a popular and able representative.

William F. Jobbins, Inc., Aurora, Ill., announces that **W. A. McKnight,** formerly connected with the Aluminum Company of America, has accepted the position of vice-president and general manager of this corporation. Mr. McKnight brings to this work an extensive experience in the metallurgy of aluminum and other non-ferrous metals, having from 1915 to 1922 been superintendent of the Niagara Works of the Aluminum Company of America, and later associated with that company's sales department .

M. G. **Kopf, E. E.,** an industrial engineer of wide experience and well known throughout the metal and plating trades in the middle West, is now employed by the Magnus Chemical Company, of 718-728 Atlantic Avenue, Brooklyn, N. Y., manufacturers of Magnus Cleaners. Mr. Kopf will be active in a sales and engineering capacity, maintaining headquarters at Dayton, Ohio. From this point his services will be available to Magnus users and prospects in the middle West in rendering sales-engineering service in conjunction with the regular Magnus district sales managers and representatives.

The brass trade in Birmingham and throughout England has heard with great regret of the serious breakdown in health of **J. W. Madeley,** director of the **Brassfounders Employers' Association.** Mr. Madeley was for many years the Birmingham managing director of United Brassfounders and Engineers, Limited, a corporation that has important works at Birmingham, Manchester, Stroud and Halifax. He resigned his position about twelve years ago to devote himself to the reconstruction of the trade organization. As his breakdown precludes the hope of again engaging in business, Mr. Madeley has resigned his official positions. He is succeeded as director of the Brassfounders Employers' Association by **R. G. E. Freeman,** who for some years past has been president.

H. L. Woodruff, of the **Atlas Copper & Brass Company,** Chicago, is willing to grant friends who want him to go fishing eight hours, ten minutes and forty-two seconds of his time during business hours, but only 5 seconds to friends who want to tell him the latest story. He does not say whether there would be a change in the time limit if the story was a fishing story. Mr. Woodruff has issued a unique business card on the back of which he has printed the time limit for interviews during business hours in his establishment. The list reads like this:

Friendly calls, two minutes; friendly calls (when busy) one minute; life insurance agents, one second; book agents, two seconds; friends with a great scheme, five seconds; friends willing to let us in on the ground floor, no time; friends with a sure winner, one second; friends who want us to go fishing, eight hours, ten minutes, forty-two seconds; friends who ask us to drink, ?; friends who ask us to lunch, sixty seconds; friends wanting to borrow $5, three seconds; friends wanting to borrow $10, two seconds; friends wanting to borrow $100, one second; collectors (we remit by mail), no time; bores—male, no time; bores—female, six seconds; bores—female, if attractive, fifty-eight seconds; Advertising solicitors, one second; those wanting to pay old bills, sixty hours, sixty minutes, sixty seconds; friends having the latest story, five seconds.

Deaths

JOHN J. GROSS

John J. Gross, died June 2 at his home in Brooklyn. Mr. Gross was a supervisor in the plant of the Doehler Die Casting Company, Brooklyn.

CHARLES T. TAYLOR

Charles T. Taylor, died on June 13, at the age of 67 years. Mr. Taylor had been with the William Cramp & Sons Ship & Engine Building Company, Philadelphia, since 1892. He was secretary-treasurer of that company for many years.

C. L. WAGANDT

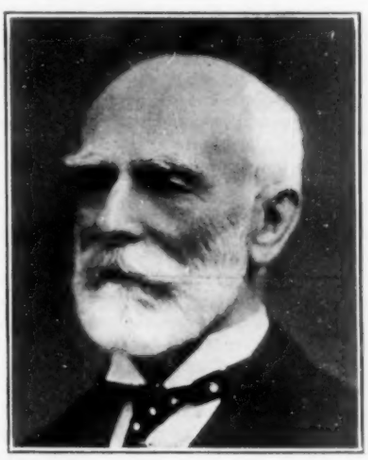
C. L. Wagandt, a director of the National Enameling & Stamping Company, and manager of Baltimore factory, passed away at his home in Baltimore on July 7, at the age of sixty-five years. Starting in the industry fifty years ago as an apprentice in the plant of Koehn & Hagerty, Mr. Wagandt soon became manager of a department. Eventually he assumed full charge of the factory. In 1902, when the Koehn & Hagerty factory was consolidated in the National Enameling & Stamping Company, Mr. Wagandt remained as manager of the Baltimore plant and later became a director of the company. Mr. Wagandt is survived by his wife and four children.

OSCAR P. BENJAMIN

Oscar P. Benjamin, president of the Capitol Brass Works, died suddenly in Indianapolis, Ind., Monday, July 16. He was born in Mount Ayre, Indiana, and educated in Perdu University. He entered his business career at Lafayette, Ind., going later to Pittsburgh and from there to Detroit, where he was also at one time general manager and vice-president of the Detroit Brass Works. He was a past master of the Masonic lodge at Lafayette, Ind., and an Odd Fellow. He also was a member of the Detroit Golf Club and the Board of Commerce.

WALTER MONTEITH AIKMAN

Walter Monteith Aikman, a pioneer and for three-quarters of a century, an outstanding figure in the stamping, enameling and galvanizing business, died July 6, at his home in Greenwich, Conn., in his 96th year. At the time of his death he was chairman of the board of directors of the Central Stamping Company of New York and Newark, N. J., with which he had been connected for nearly 77 years. Mr. Aikman was thus identified with the enameling industry during practically its entire history in this country and until the last few years was a prominent and active member in associations in the industry. He became president of the Central Stamping Company in 1886, holding that office until 1922, when he became chairman of the board of directors.



WALTER MONTIETH AIKMAN

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

AUG. 1, 1923.

Damage of approximately $25,000 was done by fire to the plant of the **Thinsheet Metals Company** on Railroad Hill and Eagle streets on the 14th. The fire is said to have started from overheated muffles left by the factory workers the night before. The flames were pouring through the roof before the fire was discovered by the engineer on a passing freight train who stopped his train and blew several long blasts on the engine whistle to attract attention. The firemen were considerably handicapped because of the huge piles of metal stacked up in the interior of the plant. The smoke was so thick that the firemen were unable to enter for nearly an hour and when they did enter they were obliged to wear smoke masks. **Clarence E. Billings** is president of the company and **Henry T. Cross** is general manager. The fire caused but little loss of time to the factory, but one day being spent in putting things to rights before manufacturing was resumed.

Chase Companies, Inc., has lost its complaint against the director-general of railroads concerning rates assessed on 35 carloads of cartridge brass discs and brass cartridge cases shipped from Baltimore and Eddystone, Pa., to Waterbury in 1919 and 1920 according to a decision by the interstate commerce commission. The commission found the rates charged to be applicable.

If the brass companies of the Naugatuck valley owning tracts of woodland had planted those tracts to pine some years ago, they would now have a plentiful supply of box material and would not have to bring in pine from Montana and other points at a cost of $225,000 for freight alone, according to Austin F. Hawes, state forester in an address here.

John H. Goss and **Edward O. Goss** of the **Scovill Manufacturing Company, John P. Goss** of the **American Brass Company** and **Alton Farrel** of the **Farrel Foundry,** all of this city, have been elected members of the national council of the **National Economic League** to represent the state. The aim of the league is to provide a means for giving expression to the informed and disinterested opinion of the country regarding economic, social and political problems.

The **Mad River Water Company,** controlled by the **Scovill Manufacturing Company** and which furnishes water to that company, recently lost its test case in the superior court to oust the Equinox club and other occupants of lots about Hitchcock Lake from enjoying certain water rights on the lake. Through its counsel, Attorney W. W. Gager, it is now perfecting its appeal to the supreme court. The company contended that the cottagers could maintain no docks, boats, etc., on the lake without a permit from it, which permit it offered at the nominal sum of $1 a year.

A patent for a vanity box has been granted to **Burdon P. Hyde** of the **Scovill Manufacturing Company.**

Business difficulties which have beset the **Bristol Manufacturing Company** of Bristol for the past three years culminated in the appointment of a receiver by Judge John P. Kellogg at Bridgeport, recently. The application was made at the instance of the company itself. The American Trust Company of Bristol was named receiver. Counsel for the company declared that the assets were far in excess of the liabilities. Lines of manufacturing previously showing a fair margin of profits, by reason of decreased demands, increased labor and material costs and gradually increased expense of manufacturing, have become highly unprofitable, he states. New lines entered into have called for expenditures for plant facilities far in excess of anticipation so that the resources of the company have been taxed beyond further endurance. The Bristol Manufacturing Company of Bristol is in no way connected with the Bristol Company of Waterbury, the manufacturer of recording instruments.

More than 300 **Scovill Manufacturing Company** girls, in a fleet of special cars, visited Savin Rock on the 14th for the annual outing and field of the Scovill Girls club. Water and land sports were enjoyed, the return trip being made by way of Lighthouse Point.—W. R. B.

BRIDGEPORT, CONN.

AUG. 1, 1923.

Bridgeport factories have now reached the point where production and sales are greater than at any time since the collapse of the post war business rush, according to the First National bank's barometer index number for the month. The index number of 177 reflects industrial sales and is the highest point reached since the bank started keeping the barometer, now over two years ago. Compared with an index of 131 for July in 1922, the past month's payments were 35 per cent greater in volume.

Broad questions of patent rights, possibly affecting many owners of patents throughout the United States are involved in the suit announced by United States Attorney Hayward against the **American Chain Company, Inc.,** under the Sherman Act. The government's suit, which alleges that the Bridgeport concern has a 60 per cent monopoly of the automobile bumper industry and may attain a complete monopoly through its patents will be vigorously contested by the company, according to its president, Walter B. Lashar.

Application for the appointment of a receiver for the **Maurice Schaack Company** has been made in the superior court by the Amsterdam Casualty company of New York on the ground that the local concern is in danger of attachment and litigation which would impair the value of the assets.

Through their donation of $1,392 to the **Employes' Tuberculosis Relief Association,** the **American Chain Company** and employes break all records for contributions to the organization, it has been announced. The association is now caring for 46 employes of local shops and their dependents. In addition to the contribution the ladies of the executive offices are caring for two children who are in sanitariums.

Meeting of the boards of directors of local factories this month is expected to authorize a number of substantial increases in memberships in the Chamber of Commerce. More than 30 new members were brought in in one day and a total of 576 since the present drive for new members started.

The monthly report of the federal department for Bridgeport of Labor states a shortage of skilled workers locally. "Industrial activities continue to improve and practically all plants are running full time with some on overtime basis. Shortage of workers noted in nearly all lines particularly in the metal, rubber, silk and building trades," the report states. "Building trades very active with shortage of certain mechanics and common laborers. Housing conditions as a whole are satisfactory."—W. R. B.

TORRINGTON, CONN.

AUG. 1, 1923.

Continuation of full time schedules with plenty of work for everybody is the cheerful outlook for fall in Torrington. The plants are all working full time now, wages are good and orders are coming in satisfactorily. Cuts in copper and sheet brass prices have stimulated trade. Practically every one of the plants could use more help—both skilled and unskilled.

The greater part of the main office force of the Torrington Branch of the **American Brass Company** is to be moved to Waterbury about August 18. A number of the workers will continue to reside in Torrington, commuting between this town and Waterbury.

Torrington, which has been under the dual town-borough form of government since 1888, is to become a city—the 13th city of Connecticut in population—on October 1, the new charter authorized by the recent legislature having been overwhelmingly approved by the voters. Among those who were on the committee which drafted the new chartec were Henry **G. Ellis** of the Torrington Manufacturing Company, Thomas **W. Bryant** of the Union Hardware Company and Frederick **W. Fuessenich** of the Hendey Machine Company.

Construction work has been started on a $50,000 addition

to the plant of the **Progressive Manufacturing Company.** The addition is being built on the lot north of the present factory building on Norwood street.

Vincent, seven-year-old son of **Vincent W. Allen,** mechanical supervisor at the Toronto plant of the American Brass Company, died during the past month in Toronto following an illness of two weeks with diphtheria. Mr. Allen formerly was engaged at the Torrington plant of the Brass company but moved to Canada about two years ago.—J. H. T.

NEW BRITAIN, CONN.

Aug. 1, 1923.

The mid-summer slowdown, so often evident in manufacturing circles has not affected New Britain industries to any appreciable extent and in practically every instance the big factories here are operating at a full time schedule and with a full complement of hands. Looking ahead to the fall, predictions, while not positive, tend to show that there hardly is expected any decline in trade. Reports from the various sales offices of New Britain concerns manufacturing builders' hardware indicate that there is a persistent belief among the tradespeople that prices may decline in the fall or winter, and therefore they are not buying much more than enough for their immediate needs.

Foreign business seems quite good, especially at the **Stanley Works** where there is a brisk Far Eastern trade, especially with Japan. Also, there is a good South American trade and some products are being sent to Europe. **Landers, Frary & Clark** are running along briskly, the electrical appliances departments being especially busy. At the **North & Judd Manufacturing Company,** makers of harness trappings, buckles, etc., business is brisk with no signs of a let-up and at the **Traut & Hine Manufacturing Company** there is a good demand for the small metal novelties made there. The **Russell and Erwin Company** is finding a ready market for its locks, door fasts, bolts, door checks, etc., and at the **P. & F. Corbin** plant these same products are being readily absorbed by the trade. The **Corbin Screw Corporation** is quite busy and the **New Britain Machine Company** is steadily expanding its trade until now it does not seem unreasonable to expect that within a very few years the plant may be back on its pre-war footing. The **Buol Machine Company,** which is headed by **Abraham Buol,** for many years superintendent of the **New Britain Machine Company,** while one of the newer and smaller concerns, has already a fair sized clientele and is doing a good business.

An announcement of considerable interest, especially in the electro-plating trades, is that **George Hogaboom,** for a number of years head of the electro-plating and the research department at the **Scovill Manufacturing Company** in Waterbury, has left that concern and has returned to the **P. & F. Corbin** factory in this city where he again is in charge of the electroplating department.—H. R. J.

ROCHESTER, N. Y.

Aug. 1, 1923.

Rochester manufacturers are loath to discuss trade conditions. In that respect they are quite the most conservative to be found in any city in this country. Efforts to obtain a line on the fall's business outlook has met with little success, owing to the reluctance of the heads of the larger plants to discuss these things for publication.

From purchasing agents it is learned that trade conditions in Rochester are considered very promising for both fall and winter, and that the regular ordering of raw materials is proceeding with these facts in mind. Employment is greater in all the larger plants this summer than a year ago, which means that production is still being maintained at a fairly high level.

All brass foundrymen claim to be busy this summer, and it is true that there is not an idle moulder in Rochester. Much special work for shipment to nearby points is being handled in Rochester foundries this year.

Indications point to a marked increase in production before September 1st, unless general business is affected by unfavorable financial results in the agricultural areas of the Central-West and the grain belts.—G. B. E.

BOSTON, MASS.

Aug. 1, 1923.

Foundries specializing in high class work continue to enjoy good business. An increasing amount of monel metal is being used and several large orders have recently been placed for work of this kind. Some of the textile mills have been in the market for monel work and one of the largest electrical concerns recently placed an order for monel linings for turbines.

Job shops, on the other hand, are not especially busy. There has been a considerable let-up in the volume of new business that is not at all encouraging. The slackening is looked upon as more than a seasonal one and reflects the general unsettlement caused by the weakness in metal prices.

Conditions in the plumbing trade are much the same. Business has slowed up to a large extent due to the hot weather and completion of many building projects. Dealers, however, are optimistic over the fall outlook when a good pickup is expected. —C. W. R.

INDIANAPOLIS, IND.

Aug. 1, 1923.

The **Indiana Aluminum Ware Company,** Elkhart, Ind., has filed certificate of final dissolution.

The **Elkhart Aluminum Ware Company,** Elkhart, Ind., has changed its name to Indiana Aluminum Ware Corporation.

A temporary restraining order against interference by the International Molders' Union of North America with the business of the Terre Haute Malleable and Manufacturing Co., of Terre Haute, was issued recently by Judge A. B. Anderson, in federal court on petition of the company. A strike of molders is on in Terre Haute and the strikers have attacked non-union employes, it is alleged.

The Indiana State Chamber of Commerce has won the first round in its fight for lower freight rates on petroleum and petroleum products including fuel oil, from the southwest to Indiana points, when, according to a telegram received by the chamber, Charles F. Gerry, attorney-examiner for the Interstate Commerce Commission, stated that he had found the existing rates to be unreasonable and unduly prejudicial.

George H. Moser, managing director of the State Chamber of Commerce, said that if the Commerce Commission acts in accordance with this finding there will be a reduction of rates that will save Indiana buyers of petroleum and petroleum products more than $2,500,000 a year.—E. B.

DETROIT, MICH.

Aug. 1, 1923.

Although the midsummer dull period has settled down on Detroit industries, practically all the brass, copper and aluminum concerns report a fair run of business. Those engaged in the manufacture of plumbers' supplies are not quite so fortunate, but many of these are kept busy on automobile work. The first half of 1923 has far exceeded any other business period here, not even excepting the year just following the war. Most manufacturers forecast a good run of business through out the fall and the coming winter. Many plants already are entering their fall campaign and this is especially true regarding the automobile accessory concerns, as well as the big automobile plants themselves.

The **Lakeshore Jewelers, Inc.,** which is owned by the Star Watch Case interests, is planning the construction of a factory building fronting 240 feet on South James street, at Ludington, Mich.

The **Truck Parts & Foundry Company** has moved into a larger building at Alma, Mich., where it will increase its output of brass and aluminum products.

The **Hall Lamp Company** here has declared a dividend of five per cent, payable on July 14 to stock of record of July 10.

It is reported here that the **Calumet & Hecla Mining Company** is still negotiating for the purchase of the **Detroit Copper & Brass Rolling Mills.** It is said the purpose of the Calumet & Hecla in attempting to acquire this big Detroit plant, is

to establish an outlet, through its own organization, for a major portion of its product which would have a stabilizing effect on its mining operations. It is also understood that the step will not be taken unless the proposed consolidation with the Ahmeek Centennial, Allouez and Osceola properties is effected.

The **Standard Aluminum Castings Corporation** has recently been incorporated at Lansing, to engage in the aluminum foundry business. The incorporators are Louis Simon, 209 West Saginaw street, Lansing; John G. Kirshum, Detroit, and M. Simon, also of Lansing.

The labor situation in Detroit, to a certain extent, is an indication of prevailing business conditions. The 79 concerns that report regularly to the Employers Association show that a total of 222,948 persons are being employed. This also includes the Ford Motor Company. This total is only 7,023 less than the highest number employed at any time this year, or a falling of only three and one-half per cent.

The **Aluminum Company of Michigan** with headquarters in Pittsburgh, has recently been incorporated at Lansing. This company will engage in the manufacture of aluminum and metal automobile parts. The incorporators are G. R. Gibbons, 2,400 Oliver building, Pittsburgh; Miles H. England and F. B. Ingersol also of Pittsburgh. The headquarters of this company in Michigan is not stated.

Another concern recently to incorporate is the **Bennett Brass Company** with a capital stock of $150,000 and headquarters at Greenville, Mich. The incorporators are Williard J. Bennett, Manufacturers building, Grand Rapids, and J. D. Miskill and E. C. Mangold also of Grand Rapids.

The **Cadillac Motor Car Company** has completed plans for the erection of three new foundry units to be added to the main factory here, the president of the company has pust announced. These plans are part of an expansion programme the Cadillac Company is undertaking for covering an increased production schedule. These new foundries will be for the production of gray iron, aluminum and brass castings used in the Cadillac car.—F. J. H.

PITTSBURGH, PA.

Aug. 1, 1923.

The policy of most buyers in the metal industry at the present time seems to be that of buying only for immediate requirements. Tool manufacturers of Philadelphia report excellent sales. The building trade is consuming the volume of the output. There is a fair demand for carpenters and masons tools. Electric drive cutting tools are in fair demand because of the number of old buildings being torn down in and about the city.

Button manufacturers are passing through a period of seasonal decline in sales.

Hardware manufacturers are active. Japanned tinware for domestic use has the call. Advances in prices are noted in various lines due to the difficulty manufacturers are experiencing in procuring skilled labor. Those available are demanding high wages and some smaller manufacturers are unable to meet this demand.

Meter manufacturers report fair activity. While sales are not as great as a few months ago, there is a satisfactory amount of business, considering the season. The building trade is buying large quantities of water meters, while a good business is being done by those manufacturing special type meters on contract.—H. W. R.

TRENTON, N. J.

Aug. 1, 1923.

Midsummer finds the metal industry in Trenton moving along smoothly with all the shops working. The larger plants, such as the **J. L. Mott Company** and the **John A. Roebling's Sons Company** are running full handed. Trenton is fortunate in not having any strikes or other labor difficulties. Workmen appear to be contented with their wages and this is of great assistance to the manufacturers.

The settling of the big pottery strike was a big boost to the metal industries. The strike had been in progress for nearly eight months. Considerable brass is used in the pottery establishments, especially in the sanitary trade, and all of this is produced at the Trenton plants. The sheet metal workers of Elizabeth, N. J., and vicinity have been granted a wage increase of $1 a day. This makes the daily wage $10.

Bentley H. Pope, vice-president of the **Capital City Trust Company,** Trenton, and **William A. Smith,** president of the **Mercer Motors Company,** Trenton, have been appointed by Federal Judge Runyon as receivers of the Mercer Motors Company at Trenton, N. J. The receivers will operate the Mercer concern for a period not yet determined.

The **Bedford-Downs Ordnance Company,** of Washington, D. C., has been incorporated at Trenton with $50,000 capital. The incorporators are David G. Downs and Walter S. Bedford, of Washington. Downs is the inventor of a special type firearm, which the new concern will manufacture, though the factory will not be located at Trenton.

V. B. Giggin & Sons, Inc., of Atlantic City, N. J., has been incorporated with $125,000 capital to deal in hardware.

Sterling Supply Stores, of Newark, N. J., has been incorporated at Trenton with $100,000 capital stock to deal in Jewelry.

The **Manufacturers' Council of New Jersey,** which has always been in friendly co-operation with the State Department of Labor, pays a tribute to the late **Colonel Lewis T. Bryant** for his work as Commissioner of Labor. The council, through President Warren C. King, has placed its services at the disposal of the Department of Labor to assist in securing places for the patients of the rehabilitation clinic and has called upon all the manufacturers of the state for their co-operation.—C. A. L.

PROVIDENCE, R. I.

Aug. 1, 1923.

While business in the various lines of the metal trade is below normal reports from all sections of the State indicate a marked improvement during the past month and encouraging prospects for a further and continued improvement for an indefinite period. In the several branches of the building lines there has been more activity during the last couple of months than for some time previously and these have an apparently good outlook. The jewelry industry and its co-ordinate lines give indications of the most improvement in the immediate future and an exceptionally brisk fall season is anticipated.

Great preparations are being made by the manufacturing jewelers of this city and the Attleboros for the reception and entertainment of the **American National Retail Jewelers Association** which is to hold its annual convention at the Providence-Biltmore Hotel the last week in August. One of the special features will be tours of visitation to the various manufacturing plants, upwards of fifty concerns having extended invitations to the delegates to visit them.

The **Union Plate and Wire Company** of Attleboro received an order recently over which they have taken considerable commendable pride, connecting as it does the town and industry indirectly with the presidential party on its return from Alaska. The order was for solid gold stock to be utilized for the manufacture of a limited number of gold pens. These were sent to the Pacific Coast and presented to President and Mrs. Harding, as well as to other members of the group which accompanied the country's Chief Executive on his trip across the continent and to the northernmost territory of the United States.

Thomas B. Nichols has been appointed manager of the refining plant of the **Jewelers' and Silversmiths' Co-operative Refining Company** at North Attleboro.

Jenkinson Brass Foundry is increasing its facilities for large castings in brass, bronze and aluminum at its plant, 139 Clay street, Pawtucket.—W. H. M.

OAKLAND, CAL.

Aug. 1, 1923.

Generally speaking the trade is now as good as it has ever been with all of the shops busy and the exception to this report is rare.

Johnson and Harris report lots of work at their shop at

2542 Telegraph avenue. At the plant of the **Progressive Plating and Enameling Works,** under the management of **A. C. Cavallera,** a report is made of a recent fire that almost proved their ruin, but after one week they were again going strong. The loss from the fire amounted to a damage of $6,000 but was covered with insurance. This concern has the Pacific Coast agency for the **Utalite Enameling Process** and this has brought in a very large volume of business. Their plant is located at 857 27th street, Oakland. At the plant of the **Haws Plating Works,** which is owned by **E. M. Alexander** at 1808 Harmon street, business is reported as exceptionally good, but is mostly small work with the exception of one contract. The **Oakland Retinning Company,** under the direction of M. **A. Wright,** business is reported as good. Competition has bothered some with lower prices and work under standard, but this condition has now passed the period where "Class" has begun to tell and the trade is returning to this shop. A great portion of their work is the retinning of milk and ice cream cans.

The **Johnson Tinning and Manufacturing Company** of Modesto, under the management of **J. M. Walthal,** has been incorporated for fifty thousand dollars and is now in line for its share of the trade in that part of the state.

At the plant of the **Sunset Plating Works, John J. O'Brien** has asked that mention be made of the fact that he desires to add a line of plumbing fixtures and specialties as his firm is working into this business from a jobbing standpoint and believes the East will supply him with some specialty that can be profitably marketed from his plant. The address of this firm is 360 Clemantina street, San Francisco.

In San Francisco some twelve divisions of the metal trades are operating under the direction of F. C. Metcalf as secretary with offices in the Rialto Building. These twelve divisions in addition to that of the Nickeling and Finishing Trades include, Foundries, Machine Shops, Forge Shops, Steel Ship Builders, Wood Ship Builders, Pattern Shops, Gas and Diesel Engine Builders, Sheet Metal Shops, Pipe Fitters, Copper Smiths, and Boiler Makers. F. C. Metcalf stated that in some of the divisions price cutting had been done but he believed in time the members would learn the foolishness of this practice.—J. W. M.

MONTREAL, CANADA

AUGUST 1, 1923.

Conditions in the metal working industry continue to be better than at any time in the past two years. Manufacturers of brass products report forty to a hundred per cent increases in sales over the same period last year.

Further impetus to employment is announced by the Dominion Bureau of Statistics, the labor situation being more favorable than at any time since December, 1920. A combined payroll of 800,605 workers is reported by the 5,865 firms making returns to the government, as compared with 754,021 employees at the beginning of May. All provinces are sharing in the upward movement, but the gains in Quebec and Ontario, where work for an additional 36,000 persons has been found, greatly exceed those reported elsewhere.

The formation of **Stanley Brock, Ltd.,** with headquarters in Montreal to act as sole representatives in Quebec and Maritime Provinces for the following manufacturers of brass goods: **Standard Sanitary Manufacturing Company,** Toronto; **Galt Brass Company,** Galt, Ont., **Fred. Somerville Company,** Toronto.—P. W. B.

BIRMINGHAM, ENGLAND

JULY 19, 1923.

Business has slackened a little during the last two or three weeks in many of the metal industries as far as home requirements are concerned. The revival of shipbuilding has been checked by the prolonged dispute with the boiler makers, who still refuse to work under the national agreement which the other shipyard workers have accepted. Orders for machinery parts, cabin and other fittings, lamps, etc., which in ordinary times provide a large quantity of work for the brass and other trades in this district, are coming in very slowly. Builders' brassfoundry is also less in demand for the home market than was anticipated, the progress of building being still very slow. The makers of stamped brass foundry are fully employed but this is due mainly to an improvement in export business. It is export trade in fact which is keeping the brass and other metal industries most largely occupied. A steady demand from overseas especially from Australia and New Zealand is maintained for gas, steam and water fittings. The Indian market is now much more open and some good orders have recently been received for brassfoundry, especially in the cabinet department. A little more business is being done also with South Africa, and with the Far Eastern markets. An increase in orders and enquiries is reported from the rolling mills and more sheet and strip brass and copper is now in request. Among the busiest departments in the home trade are those which are auxiliary to the automobile industry, the output of which has been well maintained throughout the year, chiefly owing to the enterprise of manufacturers in bringing out light cars. Various sections of the aluminum trade have benefited by this state of things, and the output of the lamp trade has also been favorably affected. Orders for electroplate goods have fallen far short of productive capacity for a long time past. The cloud which has overhung the jewelry trade for the last year or two shows no sign of lifting. Fashion is at present against the lavish use of jewelry, but the chief cause of depression in this as in other luxury trades is the general want of confidence which renders the great majority of the population unwilling to incur unnecessary expenditure. A falling off has taken place in the home demand for aluminum hollow-ware. This is partly due no doubt to general conditions but there seems reason to believe that the enthusiasm for aluminum is somewhat abating and that some of those who made experimental purchases are not so keen now upon its virtues for ordinary domestic purposes. Manufacturers in the trade, however, show great enterprise in adapting the metal to various decorative and useful purposes and in this way a falling off in output seems likely to be averted. Makers of gas and electrical fittings have recently experienced a great improvement in both home and export business. A good deal of building activity exists in the Argentine and in some of the British Dominions and builders' hardware and domestic fittings figure largely in the increased export trade.—G.

Business Items—Verified

J. P. **Ward Foundry,** 1402 College avenue, Elmira, N. Y., has installed a cupola for making gray iron, brass, bronze and aluminum castings. This firm operates the following departments: brass, bronze and aluminum foundry, casting shop.

The **Gibbs Metal Container Company,** Columbia, Pa., has erected a modern building 50 x 175 feet, 2 floors, the same having been equipped with modern up-to-date machinery. Most of this company's work will be stamping screw caps from aluminum, zinc and brass as well as other fancy articles from this material. It has also equipped a most modern nickel plating room for nickeling copper, gold and silver.

The **Great Western Smelting & Refining Company** with headquarters at Chicago, is building a new warehouse and smelting plant on Russell street running from Woodland avenue to Highland avenue, Detroit. This plant will cover about one acre, all on one floor, with additional yard space of about one acre and will be equipped with the most modern apparatus for the handling, grading and smelting of metals. Albert Kahn of Detroit is the architect. It is expected that this company will move from its present plant to the new one, about December 1, 1923.

The **Pryibil-Genzlinger Machine Company,** formerly located in the Herald Building, is manufacturing spinning lathes, all ball-bearing wood turning lathes as well as accessories, at 22 to 26 Frost street, Brooklyn, N. Y. It is in a position to ship from stocks and also carry oval chucks, trimming and

beading attachments as well as compound lever spinning attachments. Both P. L. Pryibil and F. M. Genzlinger were formerly executives of the P. Pryibil Machine Company, established in 1859.

The **Chase Metal Works,** Waterbury, Conn., will commence the erection of a one-story addition, 30 x 72 ft.

The **New Jersey Zinc Company,** 160 Front street, New York City, has purchased the Durex Chemical Company of New York.

The **Federal Manufacturing Company,** 162 W. Long street, Columbus, Ohio, reports that the rumor that it is contemplating the erection of a new plant near Holland, Mich., is erroneous.

The **Commercial Solvents Company,** 17 East 42d street, New York, has commenced the remodeling of its new plant at Peoria, Ill., comprising the former factory of the United States Food Products Company, recently acquired. It is expected that the new plant will be in operation late this year.

The Crown Rheostat & Supply Company, Chicago, Ill., has purchased ground 100 x 130 on which to erect a building. Their growing business demands more space and especially since they expect to manufacture some items they are now jobbing. They expect to erect this building this fall.

The Unique Art Manufacturing Company, Newark, N. J., has purchased a four-story building at the southeast corner of Waverly and Peshine avenues, on site 100 x 115 ft. for $150,000, and will establish a new plant for the manufacture of mechanical toys. This firm operates the following department: tool room.

The Bellaire Enameling Company, Bellaire, Ohio, is contemplating the erection of several buildings and is making arrangements to get suitable space either in Bellaire or elsewhere. This concern operates the following departments: brass machine shop, tool room, grinding room, cutting-up shop, spinning, stamping.

The Polly Manufacturing Company, 431 Chestnut street, Milwaukee, Wis., manufacturer of lighting fixtures and art metal products, has changed its corporate title to Polly Lane, Inc. H. S. Polacheck is secretary. This firm operates the following departments: brass machine shop, spinning, brazing, plating, soldering, polishing, lacquering.

The entire affairs of the **Shepard Art Metal Company,** Detroit, Mich., were taken over by the **Ternstedt Manufacturing Company,** Detroit, and in the future the business will be operated as the Ternstedt Manufacturing Company, Shepard Art Metal Division. They are now in a position to furnish complete sets of interior hardware fittings as well as mechanical hardware equipment.

The American Nickel Corporation has discontinued its Pittsburgh sales office and has moved the sales organization to the main office and plant at Clearfield, Pa., in order to improve service to customers on their 99% pure malleable nickel production of sheets, rods, wire, castings, tubes and rolled anodes. This firm operates the following departments: nickel foundry, grinding room, casting shop, cutting-up shop, rolling mill.

The Lebanon Brass Works, Lebanon, Pa., have purchased the property of the Lebanon Brass Manufacturing Company, at Second and Canal streets. The works will turn out high grade brass, bronze and aluminum castings and nickel plating. The new company is organized under the laws of Pennsylvania with a capital of $20,000. This firm operates the following departments: brass, bronze, aluminum foundry, grinding room, casting shop, plating, polishing, lacquering.

The **Price-Pfister Brass Manufacturing Company, Inc.,** 2923-3011 Humboldt street, Los Angeles, Calif., has purchased the entire business of the Price, Corcoran & Pfister Company. In addition to the machine shop and foundry formerly owned by the latter company, it is erecting a new foundry. The company also has 70,000 square feet of space and intend within one year to have same fully taken up with machine shop and foundry space, on which they will expend $100,000.

The Blakely Manufacturing Company, Fullerton avenue and Monnier Road, Detroit, Mich., manufacturer of wire products, heretofore located at 5675 Wabash street, has acquired the plant and equipment of the Liberty Stamping and Manufacturing Company, Coon street. The machinery will be removed to the new works of the purchasing company for expansion in the line of metal stampings and kindred specialties. This firm operates a stamping department.

Fire recently destroyed a portion of the plant of the **Copper Clad Steel Company,** Rankin, Pa., manufacturer of steel, welded copper and other metal products, with loss estimated at $75,000; the wire mill, 150 x 250 ft. was demolished. Fortunately, they have been able to purchase all their requirements of new machinery and will be in full operation within 15 days. This company operates the following departments: Melting, molten welding, rolling mills, cutting and straightening, radio wire, bond wire, specialty, ground rod.

The Illinois Valve & Manufacturing Company, recently incorporated with $15,000 capital stock, has leased a plant at 4247 Ravenswood avenue, Chicago, Ill., and is manufacturing patented plumbing and heating specialties, the first product to be introduced on the market being a patented pop-up basin waste which is made entirely of brass. The company is also engaged in the brass finishing and screw machine products business. This firm operates the following departments: brass machine shop, tool room, plating, stamping, soldering, polishing.

The Northern Electro-Plating Company has established a plant at 302 West 53rd street, New York, for job and contract work in nickel, brass, copper and silver plating and oxidizing. They will also do sand-blasting. The plant is equipped for turning out large and small orders and includes nineteen tanks of various sizes. High grade work will be solicited. B. M. Alter is general manager, Morris Goldstone, sales manager, J. Kessler, formerly for eight years in charge of the plating laboratory of the Emerson Phonograph Company, will occupy a similar position with the Northern Company and L. Deitch will supervise production. An automobile service of two trucks has been established to call for and deliver work.

INCORPORATIONS

The **Metal Toy Works,** Whitewater, Wis., has been organized by Curt Schmiers, C. R. Unkirch and L. O. Gums, with $10,000, to manufacture metal toys and novelties. A building has been leased and some machinery has been installed.

The **Allied Industrial Products Company,** 1115 Washington Boulevard, Chicago, Ill., has been organized with a paid in capital of $30,000. This concern is made up of former employees of James H. Rhodes & Company. R. W. Conlin is president, Mr. Cahill, vice-president and Mr. Lawler, secretary and treasurer, and in charge of the Chemical and Cleaning Department. The company will manufacture and import. It will represent the K. F. Griffiths Buff Company for polishing wheels and K. F. Griffiths and Company for pumice stone.

NEW ENGINEERING FIRM

Charles T. Bragg, one of the best known metallurgical engineers in the middle west, has opened offices on the twelfth floor of the General Motors Building. His organization, known as the Bragg Engineering Company, will render consulting and advisory service along the lines of chemical, civil, mechanical, electrical and sales engineering.

Mr. Bragg has a long record of business and professional service. Among the positions he has held in the past are those of President of the Detroit Board of Water Commissioners, Director of the American Institute of Metals, Technical Director for Berry Brothers, Chemical Engineer for the Ohio Brass Company and Works Manager for the Michigan Smelting & Refining Company.

Associated with the Bragg Engineering Company in a consulting capacity is Col A. T. Leisen, known as the engineer who had charge of the building of Camp Custer.

The Bragg Engineering Company is acting as consultant for the brass manufacturers of Detroit. The organization acts also as general agents for the Jonathan Bartley Crucible Company, of Trenton, N. J., manufacturers of crucibles and electric furnace linings. They represent the E. M. Smith-Warner interests as coal distributors.

BUSINESS TROUBLES

The receiver of the **Standard Parts Company,** Cleveland, Ohio, has paid to date to creditors dividends of 60% upon the principal amount of the debts outstanding, exclusive of interest. From the accounts receivable and cash items in the receiver's hands, and from the proceeds of the property remaining unsold, a substantial dividend should be paid in addition. The receiver is unable to state at present the amount or the time of payment of this additional dividend.

TIN SMELTER CLOSES DOWN

American Smelting & Refining Company will close its tin smelter at Perth Amboy, N. J., July 1, owing to inability to get further supplies of Bolivian tin concentrates in competition with English tin smelters, which are able to smelt at much lower cost because of cheaper labor and supplies. It is understood that the only other tin smelter still operating in the United States will close about July 31. All five smelters in the United States will thus have been shut down, it is claimed, owing to failure of Congress to place a tariff upon tin.

TESTING METAL BY SOUND

Stretching a metal until it squeaks and listening for the squeak with a microphone will give a test showing how much strain that metal can stand as a girder in a bridge or a rail in a railroad, according to experiments conducted in the physics department of Lehigh University, Bethlehem, Pa. These experiments may develop a novel method for finding quickly and accurately the elastic limit of metals, the Lehigh scientists expect. By this method all forgings may be rapidly tested before they are put into use. Several kinds of metals have been used in the Lehigh tests. While professors listened through a sensitive microphone similar to the dictaphone for the faintest sound, the metal was subjected to a gradually increasing pull until it broke. It was found that squeaking, rasping sounds were produced after the pull had reached a certain definite value, and this value was different for the different metals used. The tests indicated that the sounds were not produced until the elastic limit of the material had been reached. The work will be continued with more refined apparatus in the Lehigh physics laboratory, it is expected.

CIVIL SERVICE EXAMINATION

The United States Civil Service Commission announces the following open competitive examination: Junior Engineer, Junion Physicist, Junior Technologist.

The examinations will be held throughout the country on September 5. They are to fill vacancies in the Bureau of Standards, Department of Commerce, at entrance salaries ranging from $1,200 to $1,500 a year, plus the increase of $20 a month, and vacancies in positions requiring similar qualifications. Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil-service examiners at the post office or custom house in any city.

USE OF COPPER GROWS

The consumption of copper in building construction is now upon the basis of 230,000,000 pounds a year, according to a survey just completed by the Copper and Brass Research Association. This compares with 1922 consumption of 150,000,000 pounds and 100,000,000 pounds in 1921. Among other interesting data developed by this survey is the fact that a total of 5,175,000,000 feet of leaders and gutters are now in use on residence buildings in this country, and that a total of 4,120,000 home-owners renewed rusted leaders and gutters last year. In making these replacements, a total of 61,805,500 pounds of copper was consumed.

Between 125,000,000 and 200,000,000 pounds of copper will be consumed for transmission lines to be erected this year at a cost of approximately $125,000,000, according to estimates made by the Copper and Brass Research Association. A statement issued by the association says in part:

"The estimated expenditure of $900,000,000 for transmission line construction in the United States during the next five years will afford a market for copper wire and cable of between 900,000,000 and 1,500,000,000 pounds."

CHILEAN COPPER BREAKS RECORD

Shipments of copper bars from the Antofagasta district of Chile in 1922 amounted to 73,532 metric tons, and is thought to be the largest in the history of the industry, says Vice Consul B. C. Matthews in a report to the Department of Commerce. Stocks carried over from 1921 were materially reduced, the bulk of the shipments going to the United States, although large quantities also went to Germany and other European countries. Exports of copper ores amounted to 33,363 metric tons in 1922, as compared with 30,031 tons in 1921.

BRASS MAIL BOXES

An important new use for brass was marked at Atlantic City, April 18, when the Postoffice Department placed the first brass mail boxes ever used in this country at all mail collection points along the boardwalk. This step is the result of an inquiry instituted about a year ago by the Postoffice Department at Washington with a view to reducing the heavy maintenance expense due to the rusting of the steel boxes, the average life of which is about three years. At the suggestion of the **Copper and Brass Research Association,** it was decided to try the brass boxes, and the Association furnished a specimen box, upon which pattern the Government manufactured the first lot of one thousand boxes at the Washington, D. C., Navy Yard.

PRODUCTION OF GRAPHITE IN 1922

The sales of crystalline graphite in 1922 amounted to 1,849,776 pounds, valued at $85,242. This was an increase of 56 per cent in quantity as compared with 1921, according to a statement given out by the Department of the Interior, through the Geological Survey. The average value of the graphite per pound was 4.6 cents in 1922, which was 1.8 cents less than in 1921.

The quantity of amorphous graphite sold was 2,200 short tons, which was an increase of 19 per cent in comparison with 1921.

The Acheson Graphite Company, at Niagara Falls, N. Y., reported sales of artificial graphite amounting to 13,031,926 pounds in 1922, an increase of 121 per cent as compared with 1921.

SECONDARY METALS*

Refined primary lead produced in the United States:	
From domestic ores	468,746
From foreign ores and base bullion	63,916
Lead content of antimonial lead ores treated at regular smelters from foreign and domestic sources	6,634
Secondary Zinc Recovered in 1922	
Secondary zinc recovered by redistillation	34,444
Secondary zinc recovered by sweating, remelting, etc.	36,326
Total zinc recovered unalloyed	70,770
Zinc recovered in alloys other than brass	10,250
Zinc recovered in brass (estimated)	60,280
Zinc dust made from zinc dross	3,783
Zinc dross used for zinc dust	4,414
Zinc dross exported	8,412
Secondary antimony recovered (nearly all in alloys)	7,090
Antimony produced from domestic ores	None
Antimony content of antimonial lead ores from domestic and foreign sources treated at regular lead smelters	1,441
Antimony imported as metal, in ore or as oxide or salts	8,872
Secondary Tin Recovered in 1922	
Tin recovered as pig tin	6,570
Tin recovered in alloys and chemical compounds	12,940
	19,510
Clean tin plate scrap treated (long tons)	134,275

* From U. S. Geological Survey Bulletin.

Old tin coated containers treated (long tons)	407
Metallic tin recovered at detinning plants (pounds)	1,445,780
Tin content of tin tetrachloride, tin bichloride and tin oxide made at detinning plants (pounds)	3,405,400
Total tin recovered at detinning plants	4,851,180
Tin tetrachloride, tin bichloride and tin oxide made at detinning plants	7,008,500
Average quantity of tin recovered per long ton of old tin coated containers	22.4
Average quantity of tin recovered per long ton of clear tin plate scrap	36.06

Secondary Aluminum Recovered in 1922

Secondary aluminum recovered	7,190
Aluminum recovered in alloys (mainly No. 12)	9,100
	16,290

Secondary Nickel Recovered in 1922

Nickel recovered as metal	104
Nickel recovered in non-ferrous alloys and salts	1,408
	1,512

INTERNATIONAL NICKEL COMPANY

Earnings of the International Nickel Company for the fiscal year ended March 31 last showed a distinct improvement over the preceding year, although still below the figures reached in 1920 and 1921, according to the annual report. The last year was one of gradual recovery from the business depression which became most acute in 1921, and net profit after deduction of all charges, taxes, depreciation and depletion amounted to $48,170. This compares with a loss of $1,335,581 the preceding year. In 1921 and 1920 net profits were respectively $2,029,700 and $2,745,734. The earnings for the last two years were as follows:

	1923	1922
†Earnings	$1,153,321	$373,086
Other income	128,950	234,267
Gross income	$1,282,271	$607,353
Expansion, taxes, etc.	435,182	523,749
Depreciation, depl., etc.	798,919	881,351
Invent. adj.	.....	537,834
Net profit	$48,170	*$1,335,581
Preferred dividends	534,756	534,756
Deficit	$486,586	$1,870,337

† Earnings of all properties, after deducting manufacturing, selling expense, ordinary repairs and maintenance. * Loss.

The balance sheet disclosed a further reduction in inventories of approximately $3,700,000, the 1923 figure having been $5,657,899, against $9,340,599 the previous year. Assets totaled $62,078,993, with the cash account $1,522,816, against $756,774 the previous year. Surplus was $10,036,667 and insurance and contingency reserves $516,667.

NO GOLD OR SILVER MINTED FOR FRANCE

The French mint last year for home use struck off 329,660,183 bronze, nickel, aluminum-bronze and copper coins to the value of 223,838,631 francs. Not one gold or silver coin was minted for France, but among the 57,000,000 additional coins produced for the colonies of Martinique, Indo-China, Morocco, Tunis, Ethiopia and Syria there was something more than a million pieces of silver and 106 gold pieces coined for the Tunisian celebration. France's copper coinage is now at the ratio of 2 francs 57 centimes per person, or 67 per cent greater than in 1913. Despite this increase in copper circulation, there is actually a great shortage of these coins, although before the war there was a sufficiency. This is paradoxical as the population is practically the same and copper is not hoarded as gold is.—NEW YORK TIMES, May 19, 1923.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$465	$510
American Hardware Corporation	100	53	57
Anaconda Copper	50	39⅞	40¼
Bristol Brass	25	10	12
International Nickel, com.	25	12⅛	12⅜
International Nickel, pfd.	100	78	79¼
International Silver, com.	100	55	70
International Silver, pfd.	100	103	106
National Conduit & Cable	100	⅜	½
National Enameling & Stamping	100	57½	58½
National Lead Company, com.	100	112	112⅞
National Lead Company, pfd.	100	110	112½
New Jersey Zinc	100	151	153
Rome Brass & Copper	100	115	125
Scovill Manufacturing Company, new	...	160	170
Yale & Towne Manufacturing Co., new	...	60	63

Corrected by J. K. Rice, Jr., Co., 36 Wall Street, New York.

TRADE PUBLICATIONS

Patents—A booklet issued by Thomas A. Hill, patent attorney, on the worth and worthlessness of patents.

Plating Supplies—A folder issued by Daniels & Orben Company, Inc., 81 Walker Street, New York, giving a reference list of Doco Brand plating and polishing supplies.

Carbon Tetrachloride—A folder issued by the Roessler & Hasslacher Chemical Company, 709 6th avenue, New York, on their carbon tetrachloride—a chemical product.

"Hisey"—Bulletin No. 3014-S, issued by Hisey-Wolf Machine Company, Cincinnati, Ohio, describing a new direct, motor-driven combination grinding and buffing machine.

Sylphon Specialties—Catalog No. 100, issued by the Fulton Company, Knoxville, Tenn., illustrating and describing their temperature and pressure controlling instruments, valves, etc.

Analysis by Emission Spectra.—Section 1 of the booklet on "Optical Methods in Control and Research Laboratories," published by Adam Hilges, Ltd., London, England. It relates to metallurgical analysis by the spectroscope.

"Washing Metals by Machinery"—A circular issued by Crescent Washing Machine Company, New Rochelle, N. Y., telling how the Crescent makes metal cleaning a simple, inexpensive machine operation. This circular is illustrated.

A. C. P.—A catalog issued by the American Chemical Paint Company, New York, listing and briefly descriibng the products and processes of that company, for removing and preventing rust and soldering, pickling and cleaning of metals. This catalog is well illustrated.

"Temperature Control"—No. 254, a leaflet issued by the W. S. Rockwell Company, 50 Church Street, N. Y., illustrating the control of temperature essential to the highest quality of heat-treated products and obtainable in properly designed furnaces, whether operated with electricity, gas, oil, coal, or other fuel.

"Thirty-Year Review"—An interesting booklet issued by General Electric Company, Schenectady, N. Y., to its stockholders reviewing the thirty years history of that company, from its foundation in 1892 to 1922. The booklet traces the development of the electrical art, the growth of the business and the rapid increase in the size of generator units, etc.

"Munning"—No. 10. A catalog issued by A. P. Munning & Company, Matawan, N. J., on their electro-plating and buffing apparatus and supplies for all industries. The following is part of the table of contents: Bench Grinding and Polishing Motors; Grinding and Polishing Motors on Stands; Grinders and Polishers; Automatic Polishing and Buffing Machines; Sand Blast Barrel, Oblique Tumbling Barrels, Horizontal Tumbling Barrels, Ball Burnishing Barrel, Tubbing Barrel; Tumbling Barrel Materials; Polishing Room Equipment; Brushes; Polishing Wheels and Belts; Buffs, etc.

A special feature of this catalog is the useful information it contains for the polisher and electro-plater, such as circular scratch brush data; storage and care of polishing wheels, speed of buffs; length of steam coils needed for cleaning and other hot solutions; comparison of centigrade and fahrenheit thermometer scales; plating room floor specifications, etc. The catalog is completely illustrated throughout.

Review of the Wrought Metal Market

Written for The Metal Industry by J. J. WHITEHEAD, President, Whitehead Metal Products Company of New York

There were no changes of any consequence in the metal business during the month of July. Most of the brass and copper mills continued to operate at very close to capacity, working on old orders and the booking of new orders seems to have been running from 50 to 75 per cent of the tonnage shipped. The amount of new business which has been placed in the last month or two is, of course, very small when compared with the tremendous volume which the mills enjoyed during the previous six to eight months. As a result of this shrinkage in the volume of orders, there was a tendency on the part of some manufacturers to cut prices in the hope of stimulating the demand. A little sober second thought however quickly corrected this tendency and it was very soon realized that there was no use in endeavoring to force sales on an unwilling market. It is also recognized as a fact that the consumers are less inclined to purchase on a falling market or one which exhibits signs of weakness. Those manufacturers, therefore, who were inclined to make an effort to fill up their order books by making unreasonable concessions in prices, were quick to realize that such a course would ultimately lead to a demoralized market and defeat the very purpose for which they were striving.

In most lines contiguous to the brass and copper trade there is a well defined feeling that the business situation is, on the whole, sound and there has been a very noticeable tendency to avoid cutting prices to the point where business might be made unprofitable. This is just the situation which has prevailed in the copper market. It is fairly evident from daily quotations that the producers do not intend to try to force the sale of their product by price reductions. There has been a comparatively small amount of metal bought in the past few months, but, nevertheless, copper quotations remain fairly firm. It is the general observation that there are not very many if any large stocks of metal or manufactured articles and the feeling is general, that very soon there will be a buying movement of considerable proportions. With this in mind the authorities in the trade do not look for any price reductions of consequence at this time.

During July there were some sizeable contracts placed for monel metal and nickel. Taken as a whole, this branch of the industry has not felt the reaction to the same degree as the brass and copper business. There are no fluctuations in prices to encourage speculative buying and the demand is consequently maintained on the basis of actual requirements. During the month the manufacture of cold drawn monel metal rods of a high quality was put on a production basis and prices established which will make it possible to apply these rods to many lines of industry to which they have not heretofore been applied, but in which there has always been a need for material of this character. It is now possible to produce these rods with a perfectly smooth surface with a tolerance of one one-thousandth of an inch and absolutely straight and true. The application of these rods to pumps and other apparatus in oil refineries, power houses, chemical plants and similar industries is expected to be very general and the demand correspondingly large.

Unless the bottom drops completely out of general business, the leaders in the metal trade believe that there is nothing to fear in the immediate future since the conditions in this industry are generally regarded as very sound.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

Business in copper last month was in comparatively moderate volume for domestic consumption. Manufacturers committed themselves very conservatively to new purchases. The abrupt price changes as occurred in May and June did not attract the large buying hoped for, although a fair percentage of inquiries developed into actual business. Prices current during the last 30 days touched the lowest point this year, namely 14¼c. to 14⅜c., but there was no indication of general buying on a very large scale by the domestic trade.

A good volume of sales for export account, however, was recorded. Offerings for foreign shipment were readily absorbed and the European demand had much to do in maintaining the recent scale of prices. While the market in July was relatively quiet, especially for domestic business, nevertheless, the consumption of copper is at a rate denoting conspicuous activity at all the leading manufacturing plants of the country. There may be some decrease in melting compared with the quantities consumed a few months ago, but that is a seasonal feature characteristic of conditions in July. The tone is fairly steady at 14⅝c. to 14¾c. for electrolytic, and 14¼c. to 14⅜c. for casting. Buyers and sellers are both waiting developments.

ZINC

The marked curtailment of operations at producing districts recently has strengthened the market considerably. Stronger foreign advices and restricted offerings in Europe has also helped to firm up the situation here. Domestic demand, however, for slab zinc was quiet, with recent buying confined principally to carload lots. Prime western brands sold at 6.25c. E. St. Louis basis. The New York basis quotes 6.60c. with more inquiry and less pressure on the part of sellers.

TIN

During the past three or four weeks the market for tin was subjected to frequent fluctuations and demonstrated its ability to recede and advance in response to the speculative whims of London operators. Fundamental conditions, however, tend to make the trade cautious in following recent spasmodic attempts to create active buying by advancing prices.

Consumers are understood to be pretty well covered on a large proportion of their future requirements. Transactions on the part of the consuming trade lately has been on a restricted scale, due in part to seasonal tendencies and to prevailing high prices. Arrivals of tin at Atlantic ports in July were 5,000 tons.

LEAD

The market for lead developed decided weakness early in July and the slackening caused a drastic reduction in price. During the first half of last month the leading selling company made six mark-downs, making a total decline from 6.65c. to 6.00c. New York basis. Consumers naturally curtailed buying until the market gave some indication of stability. On July 23 the American Smelting & Refining Co. advanced the price $5.00 per ton, making the New York basis 6.25c. per pound. Supplies for immediate shipment are apparently small. The statistical position also appears favorable to market firmness, and should current and future consumption be maintained at near the rate of a few months ago the prospects for a firm market are considered fairly good. The official price schedule was again advanced July 27 to 6½c. New York. Demand is good and prospect for conditions that will maintain the strength of the market have improved.

ALUMINUM

The tone of the aluminum market remains very steady on the basis of 27c. to 27½c. for foreign virgin metal of 99 per cent plus and 26½c. to 27c. for 98-99 per cent material. The leading domestic company is evidently satisfied with the situation which is extraordinarily favorable to a policy of keeping prices absolutely private. Imports of metallic aluminum, scrap and alloys have been in large volume during recent months. Exports of plates, sheets, etc., have also expanded to large dimensions. Consumers are understood to have stocks on hand or contracted for in sufficient volume to cover the bulk of requirements several

months ahead. Sales are more difficult and an easier tone to the market seems probable should pressure to sell arise.

QUICKSILVER

The tone of the market is weaker and prices are quoted at $65.50 per flask of 75 pounds. Demand has been quiet lately and consumers are not much interested. Market unsettled and buyers holding off. London price was quoted at £10.

PLATINUM

Price of platinum remains unchanged at $116 per ounce. Holders are apparently firm at that level of prices. Output is so restricted that there is special difficulty in maintaining market values.

SILVER

Changes in the status of the silver situation has come about since the cessation of U. S. Government purchases under the Pittman Act. The dip in bullion prices has not been as pronounced as might have been supposed possible after the important Government buying stopped. However, producers and refiners are giving the situation careful consideration in the hope that some plan will be adopted to prevent the commercial value of the white metal receding to a point that would be disastrous to producers. The average annual world output of silver during the last 22 years has been 188,400,000 ounces, of which North and South America have supplied 81.54 per cent of this production. The demonetization of silver for subsidiary coinage in bankrupt countries of Europe has cut off a large outlet for new product. A Silver Export Association is talked of for the purpose of obtaining better prices and for the purpose of carrying supplies until demand is able to absorb surplus holdings.

ANTIMONY

Demand for antimony improved slightly towards the end of July, with recent sales reported at 5 cents c.i.f. New York, in bond. Subsequent bids of 5⅛c. for future shipment from China were heard of, but sellers are inclined to hold off in expectation of getting higher prices. Offerings of Chinese and Japanese are limited. Spot stocks are quoted at 7.35c. to 7.45c. duty paid. Further strength developed in the market, with business reported for August-September shipment from China at 5½c. c.i.f. New York delivered in bond. A firmer tendency prevails for all positions, but consumers do not appear inclined to pay the higher prices until they are satisfied that the rise is justified.

OLD METALS

Conditions have been particularly quiet in the scrap metal market lately. Receding prices have not stimulated any pronounced movement, and with keen competition for whatever business develops orders are filled by those who make the most attractive concessions. It is anything but a satisfactory situation for dealers who are carrying metals at higher costs than those now current. There is some demand for heavy lead and scraps at firm prices in response to stronger market for new stock. Zinc scraps also find a ready sale at 4½c. to 4¾c. General dullness, however, was the recent feature, with a weak tendency in consequence of falling off in new business. Prices dealers are willing to pay were quoted at 11¾c. to 12c. for crucible copper, 9½c. to 9¾c. for light copper, new brass clippings 8¼c. to 8½c., heavy brass 5½c. to 5¾c., heavy leaf 4¾c. to 5⅛c., aluminum clippings 17c. to 18c., and old zinc scrap 3½c. to 4c.

WATERBURY AVERAGE

Lake Copper—Average for 1922, 13.844—January, 1923, 14.875—February, 15.75—March, 17.25—April, 17.125—May, 16.125—June, 15.25—July, 15.00.

Brass Mill Zinc—Average for 1922, 6.283—January, 1923, 8—February, 8—March, 8.70—April, 8.25—May, 7.60—June, 7.00—July, 6.80.

Daily Metal Prices for the Month of July, 1923

Record of Daily, Highest, Lowest and Average

Metal Prices for August 2

Date	2	3	*4	5	6	9	10	11	12	13	16	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	15.00	15.00	.....	15.00	14.875	14.875	14.875	15.00	15.00	15.00	15.00	15.00	15.00
Electrolytic	14.50	14.50	.....	14.50	14.50	14.50	14.50	14.75	14.80	14.70	14.65	14.65	14.35
Casting	14.25	14.25	.....	14.25	14.25	14.25	14.25	14.375	14.375	14.375	14.375	14.375	14.375
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	5.80	5.80	.....	5.85	5.90	5.95	6.10	6.20	6.25	6.20	6.15	6.15	6.10
Brass Special	6.00	6.00	.....	6.05	6.10	6.15	6.25	6.35	6.35	6.35	6.30	6.30	6.25
Tin (f. o. b., N. Y.) c/lb. Duty Free													
Straits	37.50	37.75	.....	37.50	37.75	38.50	38.375	38.375	38.75	38.25	38.00	38.00	38.60
Pig 99%	37.00	37.25	.....	37.00	37.25	38.00	37.875	37.875	38.25	37.875	37.50	37.375	37.50
Lead (f. o. b., St. L.) c/lb. Duty 2½c/lb.	6.55	6.40	.....	6.20	6.10	5.95	5.80	5.80	5.80	5.70	5.85	5.95	5.95
Aluminum c/lb. Duty 5c/lb.	27.25	27.25	.....	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25
Nickel c/lb. Duty 3c/lb.													
Ingot—Internat. Nick. Co.	29	29	.....	29	29	29	29	29	29	29	29	29	29
Outside Spot	28	28	.....	28	28	28	28	28	28	28	28	28	28
Electrolytic (Internat. Nick. Co.)													
Ni.—99.80 contam. impur.—.14	32	32	.....	32	32	32	32	32	32	32	32	32	32
Brit.-Amer. Nick. Corp.													
Ni.—98.50 contam. impur.—.80	30	30	.....	30	30	30	30	30	30	30	30	30	30
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	6.95	6.95	.....	7.00	6.90	6.85	6.85	6.90	6.90	6.90	6.90	6.90	6.90
Silver (foreign) c/oz. Duty Free	62.75	62.875	.....	62.875	63.375	63.625	63.375	62.75	63	62.75	62.875	63	63
Platinum $/oz. Duty Free	116	116	.....	116	116	116	116	116	116	116	116	116	116

Date	19	20	23	24	25	26	27	30	31	High	Low	Aver.	Aug. 2
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.875	14.875	15.00	14.875	14.970	14.75
Electrolytic	14.65	14.65	14.65	14.65	14.65	14.65	14.65	14.60	14.60	14.80	14.50	14.612	14.50
Casting	14.375	14.375	14.375	14.375	14.375	14.375	14.375	14.25	14.25	14.375	14.25	14.327	14.125
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	6.10	6.10	6.10	6.10	6.15	6.20	6.25	6.30	6.30	6.30	5.80	6.098	6.20
Brass Special	6.25	6.25	6.25	6.25	6.25	6.35	6.40	6.45	6.40	6.45	6.00	6.252	6.35
Tin (f. o. b., N. Y.) c/lb. Duty Free													
Straits	38.25	39.375	39.75	39.625	39.125	38.80	38.90	38.875	38.625	39.75	37.50	38.504	38.125
Pig 99%	37.75	38.75	39.125	39.125	38.625	38.25	38.375	38.375	38.125	39.125	37.00	37.964	37.625
Lead (f. o. b., St. L.) c/lb. Duty 2½c/lb.	6.10	6.10	6.15	6.15	6.25	6.50	6.70	6.80	6.70	6.80	5.70	6.167	6.65
Aluminum c/lb. Duty 5c/lb.	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25
Nickel c/lb. Duty 3c/lb.													
Ingot—Internat. Nick. Co.	29	29	29	29	29	29	29	29	29	29	29	29	
Outside Spot	28	28	28	28	28	28	28	28	28	28	28	28	
Electrolytic (Internat. Nick. Co.)													
Ni.—99.80 contam. impur.—.14	32	32	32	32	32	32	32	32	32	32	32	32	
Brit.-Amer. Nick. Corp.													
Ni.—98.50 contam. impur.—.80	30	30	30	30	30	30	30	30	30	30	30	30	
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	6.90	7.00	7.10	7.15	7.30	7.45	7.55	7.80	7.80	7.80	6.85	7.093	7.80
Silver (foreign) c/oz. Duty Free	63.25	63	63.50	63.125	63.125	63	62.875	62.50	62.625	63.625	62.50	63.012	62.75
Platinum $/oz. Duty Free	116	116	116	116	116	116	116	116	116	116	116	116	

*Holiday.

Metal Prices, August 3, 1923

INGOT METALS AND ALLOYS

Brass Ingot, Yellow	10½to12
Brass Ingots, Red	13¼to14½
Bronze Ingot	13¾to15½
Bismuth	$2.75
Cadmium	$1.00-1.05
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.75-3.00
Manganese Bronze Castings	22 to35
Manganese Bronze Ingots	13 to16
Manganese Bronze Forging	33 to42
Manganese Copper, 30%	28 to45
Magnesium Metal	$1.25-1.50
Parsons Manganese Bronze Ingots	19½to21
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	18½to22
Phosphor Copper, guaranteed 10%	18 to21½
Phosphor Tin, guarantee 5%	48 to58
Phosphor Tin, no guarantee	46 to56
Quicksilver	$66.50-$67.50
Silicon Copper, 10%.....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
11¾to12¼	Heavy Cut Copper	12¾to13¼
11½to11¾	Copper Wire	12½to13
9½to 9¾	Light Copper	10⅞to11¼
9¼to 9¾	Heavy Machine Comp	11¼to11¾
6¾to 7¼	Heavy Brass	8¾to 9¼
5 to 5¾	Light Brass	6¾to 7¼
6¾	No. 1 Yellow Brass Turnings	7¼to 8¼
8¼to 8¾	No. 1 Comp Turnings	9½to10
4½to 4¾	Heavy Lead	5¼to 5½
2¾	Zinc Scrap	3¼to 3½
8¼to 8¾	Scrap Aluminum Turnings	10¾to11¼
14¼to14¾	Scrap Aluminum, cast alloyed	16¼to16¾
15¼to16¼	Scrap Aluminum, sheet (new)	17¼to18¼
22¼	No. 1 Pewter	26¼
13¼	Old Nickel anodes	15¼
21¼to23¼	Old Nickel	25¼to27¾

BRASS MATERIAL—MILL SHIPMENTS

In effect June 26, 1923

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19¾	$0.21½	$0.23⅜
Wire	0.20¼	0.22	0.23⅞
Rod	0.18	0.22¼	0.24⅛
Brazed tubing	0.27¾	.....	0.33⅛
Open seam tubing	0.27¾	.....	0.33⅛
Angles and channels	0.30¾	.....	0.36⅛

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.20¾	$0.22½	$0.24⅜
Wire	0.21¼	0.23	0.24⅞
Rod	0.19	0.23¼	0.25⅛
Brazed tubing	0.28¾	.....	0.34⅛
Open seam tubing	0.28¾	.....	0.34⅛
Angles and channels	0.31¾	.....	0.37⅛

SEAMLESS TUBING

Brass, 25½c. to 26½c. per lb. base.
Copper, 27c. to 28c. per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21¾c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19¾c. net base
Muntz or Yellow Rectangular Sheets other than Sheathing	20¾c. net base
Muntz or Yellow Metal Rod	17¾c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	23¾c. to 24¾c.
From stock	24¾c. to 25¾c.

BARE COPPER WIRE—CARLOAD LOTS

17¼c. to 17½c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order	22c. per lb. base
100 lbs. to 200 lbs. in one order	22½c. per lb. base

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 8.90c. basis less 8 per cent. discount.

Casks, jobbers' prices	10½c. to 11¼c.
Open casks, jobbers' prices	11¼c. to 12¼c.

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga. and heavier, base price	37c.
Aluminum coils, 24 ga. and heavier, base price	35c.
Foreign	45c.

NICKEL SILVER (NICKELENE)

Base Prices

Grade "A" Nickel Silver Sheet Metal

10% Quality	27c. per lb.
15% "	28½c. per lb.
18% "	29½c. per lb.

Nickel Silver Wire and Rod

10% "	30c. per lb.
15% "	33½c. per lb.
18% "	36½c. per lb.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 65½c. to 67½c. per Troy ounce, depending upon quantity.

Rolled sterling silver 63¼c. to 65¼c.

NICKEL ANODES

85 to 87% purity	31½c.-34c. per lb.
90 to 92% purity	34c.-35c. per lb.
95 to 97% purity	36c.-37c. per lb.

Supply Prices, August 3, 1923

CHEMICALS

In Commercial Quantities—New York Prices

Acetone	lb.	.24½–.27
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.08
Nitric, 36 deg. Carboys	lb.	.06
Nitric, 42 deg. Carboys	lb.	.07
Sulphuric, 66 deg. Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.40–.45
Denatured in bbls.	gal.	.38–.45
Alum—		
Lump, Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02½–.03
Aluminum chloride solution	lb.	.22
Ammonium—		
Sulphate, tech., Barrels	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, Kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.06
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.07
Chrome Green, bbls.	lb.	.39¼
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, Barrels	lb.	.20
Cyanide	lb.	.46
Sulphate, Barrels	lb.	.06½
Copperas (Iron Sulphate, bbl.)	lb	.02
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	5.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.82–1.00
Iron, Sulphate, see Copperas, bbl.	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22½–.40
Salts, single, bbls	lb.	.11½
Salts, double, bbl	lb.	.10½
Parrafin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic, Electrolytic 88-92% fused, drums	lb.	.09
Potassium Bichromate, casks	lb.	.11
Carbonate, 80-85%, casks	lb.	.06
Cyanide, 165 lb. cases, 94-96%	lb.	.65
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Official	oz.	—
Rosin, bbls.	lb.	.03½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	.46
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.06
Cyanide, 96 to 98%, 100 lbs	lb.	.23
Hyposulphite, kegs	lb.	.04
Nitrate, tech. bbls	lb.	.03
Phosphate, tech., bbls	lb.	.03¼
Silicate (Water Glass) bbls	lb.	.02
Sulpho Cyanide	lb.	45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.12–.13
Sulphur (Brimstone) bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.31
Tripoli	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02½
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.13–.17
Chloride, 600 lb. lots	lb.	.07
Cyanide	lb.	.37
Sulphate, bbls.	lb.	.03¼

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base,	38.75
14 inch, 20 ply, 64/68, cloth	base,	48.15
12 inch, 20 ply, 84/92, cloth	base,	45.00
14 inch, 20 ply, 84/92, cloth	base,	60.60
12 inch, 20 ply, 88/96, cloth	base,	48.65
14 inch, 20 ply, 88/96, cloth	base,	65.50
Sewed Buffs, per lb., bleached and unbleached	base,	.60

FELT WHEELS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	2.75	2.50
" 6" 8" and over 16"	1" to 3"	2.85	2.60
" 6" to 24"	Over 3"	3.15	2.80
" 6" to 24"	½" to 1"	3.75	3.50
" 4" to 6"	¼" to 3"	4.75	Any quantity.
" Under 4"	¼" to 3"	5.35	

Grey Mexican or French Grey—10c. less per lb. than Spanish, above. Odd sizes, 50c. advance.